

Practitioner's Docket No. U 013775-0

PATENT

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

TECH CENTER 1600/2900

Application of: Selvakumar NATESAN, et al.

Serial No.: 10/032,392

Group No.: 1621

Filed: December 21, 2001

Examiner: -

For: NOVEL HETEROCYCLIC COMPOUNDS HAVING ANTIBACTERIAL ACTIVITY: PROCESS FOR THEIR PREPARATION AND PHARMACEUTICAL COMPOSITIONS CONTAINING THEM

Assistant Commissioner for Patents
Washington, D.C. 20231

TRANSMITTAL OF CERTIFIED COPIES

Attached please find the certified copy of the foreign application from which priority is claimed for this case:

Country: INDIA

Application Number: 1124/MAS/2000

Filing Date: DECEMBER 26, 2000

Country: INDIA

Application Number: 15/MAS/2001

Filing Date: JANUARY 4, 2001

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WARNING: "When a document that is required by statute to be certified must be filed, a copy, including a photocopy or facsimile transmission of the certification is not acceptable." 37 C.F.R. 1.4(f) (emphasis added).

CERTIFICATE OF MAILING (37 C.F.R. 1.8a)

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

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Signature of person mailing paper

(Transmittal of Certified Copies—page 1 of 2) 5-5


SIGNATURE OF PRACTITIONER

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NOTE: "The claim to priority need be in no special form and may be made by the attorney or agent, if the foreign application is referred to in the oath or declaration, as required by § 1.63." 37 C.F.R. 1.55(a).

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SN 10/032,392
C.N. 1621

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THE PATENTS ACT, 1970

It is hereby certified that annexed hereto is a true copy of the
Provisional specification filed in respect of Patent application
No.15/MAS/2001 dated 4th January, 2001 by Dr. Reddy's Research
Foundation, an Indian company having its registered office at 7-1-27,
Ameerpet, Hyderabad – 500 016, A.P., India.....

.....In witness thereof

I have hereunto set my hand

Dated this the 21st day of March 2002
30th day of phalguna, 1923 (Saka)

(DR.W.M. DHUMANE)
DEPUTY CONTROLLER OF PATENTS & DESIGNS

PATENT OFFICE BRANCH
CHENNAI – 600 018

FORM 1
THE PATENTS ACT, 1970
APPLICATION FOR GRANT OF A PATENT (Section 5(2), 7 and Rule 33A)

We, Dr. Reddy's Research Foundation, an Indian company having its registered office at 7-1-27, Ameerpet, Hyderabad, Andhra Pradesh, INDIA, 500 016 hereby declare

- 1.(a) that we are in possession of an invention titled **PROCESS FOR THE PREPARATION OF NOVEL HETEROCYCLIC COMPOUNDS HAVING ANTIBACTERIAL ACTIVITY**
- (b) that the provisional specification relating to this invention is filed with this application.
- (c) that there is no lawful ground of objection to the grant of a patent to us.
2. further declare that the inventors for the said invention are NATESAN SELVAKUMAR, JAVED IQBAL, MAGADI SITARAM KUMAR, MAMIDI NAGA VENKATA SRINIVASA RAO, RAMANUJAM RAJAGOPALAN, BRAJ BHUSHAN AND SUNDARABABU BASKARAN, All citizens & residents of India belonging to Dr. REDDY'S RESEARCH FOUNDATION, 7-1-27, AMEERPET, HYDERABAD - 500 016
3. that we are the assignee of the true and first inventors
4. that our address for service in India is as follows ;

The President
Dr. Reddy's Research Foundation
7-1-27, Ameerpet
Hyderabad, A.P., 500 016

5. We, the true and first inventors for this invention declare that the applicant herein is our assignee

(Signed) 
NATESAN SELVAKUMAR

(Signed) 
JAVED IQBAL

(Signed) 
MAGADI SITARAM KUMAR

(Signed) 
MAMIDI NAGA VENKATA SRINIVASA RAO

(Signed) 
RAMANUJAM RAJAGOPALAN

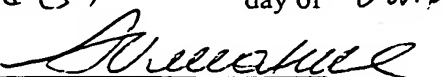
(Signed) 
SUNDARABABU BASKARAN

(Signed) 
BRAJ BHUSHAN LOHRAY

6. that to the best of our knowledge, information and belief, the fact and matters stated herein are correct and that there is no lawful ground of objection to the grant of patent to us on this application
7. following are the attachments with the application
 - (a) provisional specification (54 pages, in triplicate)
 - (b) fee Rs. 5000.00 (five thousand rupees only) in bank draft bearing no. 035512 dated December 29, 2000 drawn on Canara Bank.

We request that a patent may be granted to us for the said invention

Dated this third (3rd) day of January 2001

(Signed) 
Dr. A. Venkateswarlu
President
Dr. Reddy's Research Foundation

To,
The Controller of Patents
The Patents Office Branch, Chennai.

FORM 2

THE PATENTS ACT, 1970

PROVISIONAL SPECIFICATION

(SECTION 10)

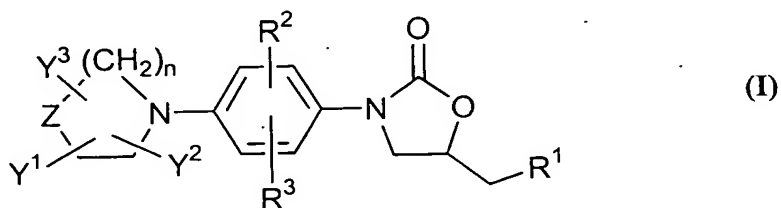
**PROCESS FOR THE PREPARATION OF NOVEL
HETEROCYCLIC COMPOUNDS HAVING ANTIBACTERIAL
ACTIVITY**

**Dr. Reddy's Research Foundation,
an Indian Company having its registered office at
7-1-27, Ameerpet
Hyderabad - 500 016, Andhra Pradesh, India**

THE FOLLOWING SPECIFICATION DESCRIBES THE NATURE OF THE INVENTION :

Filed of the Invention

The present invention relates to process for the preparation of novel oxazolidinone compounds, their derivatives, their analogs, their tautomeric forms, their stereoisomers, their polymorphs, their pharmaceutically acceptable salts, their pharmaceutically acceptable solvates and pharmaceutical compositions containing them. More particularly, the present invention relates to process for the preparation of novel oxazolidinones of the general formula (I).



their derivatives, their analogs, their tautomeric forms, their stereoisomers, their polymorphs, their pharmaceutically acceptable salts, their pharmaceutically acceptable solvates and pharmaceutical compositions containing them.

The present invention also relates to process for the preparation of novel intermediates and their use in the preparation of compounds of formula (I).

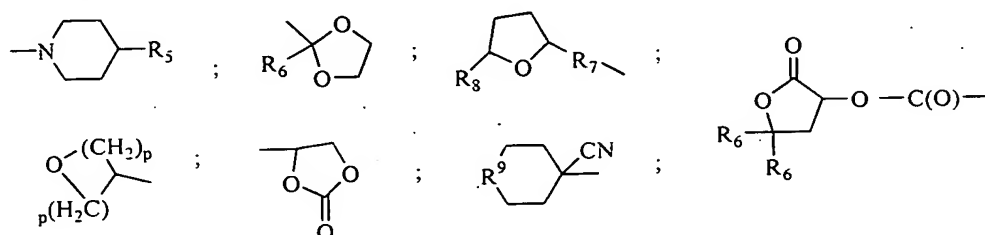
Oxazolidinones are useful as antibacterials (J. Med. Chem., 1996, 39, 673), antihistamines and ant allergic agents (EP 291,244), anticonvulsants (DE 3,915,184), treating cognition disorders, ant psychotics, platelet ant aggregators, antidepressants, sedatives, hypnotics, monoamine oxidase inhibitors (WO 97/13768) and as chiral auxiliaries (Aldrichimica Acta, 1982, 15 23) in asymmetric synthesis.

Background of the Invention

Since the discovery of penicillin, pharmaceutical companies have produced more than one hundred antibacterial agents to combat a wide variety of bacterial infections. In the past several years, due to the misuse of these antibiotics there has been rapid emergence of bacterial resistance to several of these antibiotics. The multidrug resistance among these bacterial pathogens may also be due to mutation leading to more virulent clinical isolation, the most disturbing milestone has been the acquisition of

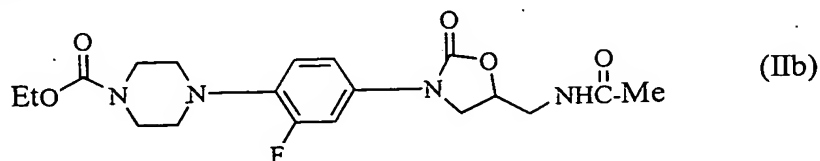
phenyl which can be substituted with one to three F, Cl, OCH₃, OH, NH₂, or (C₁-C₄)alkyl);

-C(=O)-(C₁-C₆)alkyl, -C(=O)-O-(C₁-C₆)alkyl, -C(=O)-N(R³)₂, -C(=O)-CH(R⁴)N(R³)₂, -C(=O)-CH(R⁴)-NH-C(NH)-NH₂ (where R⁴ is an amino acid side chain); -N(R³)₂, -N(CH₂)_m (where m is 2-6 and forms a cyclic structure with the nitrogen atom and where one or more carbon atoms can be replaced with S, O or NR³), -C(CH₃)=N-OR or Y represents any of the groups given below :

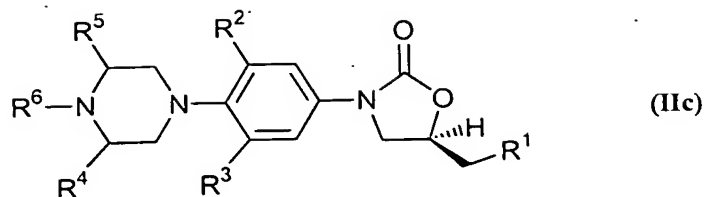


where R⁵ is OH, OCH₃, CH₂OH, CH₂OCH₃, CO₂CH₃, CO₂C₂H₅, R⁶ represents CH₃ or hydrogen, R⁷ represents CH₂ or C(=O), R⁸ represents hydrogen or =O, p is 1 or 2, R⁹ represents O, S, S(O), SO₂, CH₂, NH, NCH₃, NC₂H₅, NCHO, NCOCH₃ or NCO₂CH₃, wherein each occurrence of said (C₁-C₆)alkyl may be substituted with one or more F, Cl, Br, I, OR¹, COOR¹, CN, SR¹ or R¹ (where R¹ is a hydrogen or (C₁-C₄)alkyl); X and Z are independently (C₁-C₆)alkyl, (C₃-C₁₂)cycloalkyl or hydrogen or X and Z form a (C₀-C₃) bridging group, preferably X and Z are hydrogen; U, V and W are independently (C₁-C₆)alkyl, F, Cl, Br, hydrogen or a (C₁-C₆)alkyl substituted with one or more of F, Cl, Br or I, preferably U and V are F and W is hydrogen; R is hydrogen, (C₁-C₁₂)alkyl, (C₃-C₁₂)cycloalkyl, (C₁-C₆)alkoxy, (C₁-C₆)alkyl substituted with one or more F, Cl, Br, I or OH, n is 1 or 2; and q is 0-4 inclusive.

An example of this class of compounds is shown in formula (IIb)

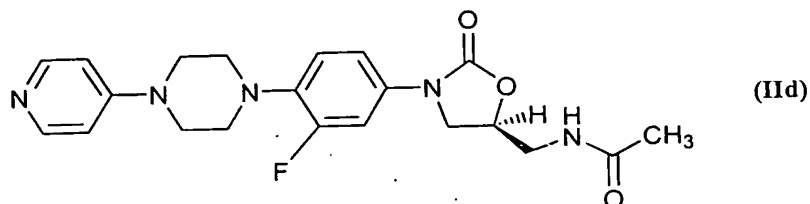


ii) International Patent Application WO 98/01447 discloses compounds of formula (IIc)

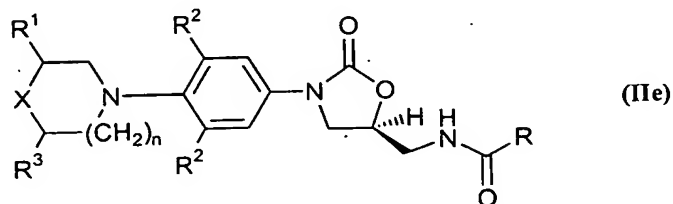


wherein R^1 represents $-NHC(=O)R^a$ wherein R^a represents (C_1-C_4) alkyl; R^2 and R^3 represent hydrogen or fluoro; R^4 and R^5 are independently hydrogen or methyl; R^6 represent pyridyl, optionally substituted by substituents selected from (C_1-C_4) alkyl (optionally substituted), halo, trifluoromethyl, (C_1-C_4) alkyl-S(O) $_n$ - (wherein n is 0, 1 or 2), (C_1-C_4) alkyl SO $_2$ amino, (C_1-C_4) alkanoylamino, carboxy, hydroxy, amino, (C_1-C_4) alkylamino, di- (C_1-C_4) alkylamino, (C_1-C_4) alkoxycarbonyl, carbamoyl, N- (C_1-C_4) alkylcarbamoyl, di-(N- (C_1-C_4) alkyl)carbamoyl (wherein the (C_1-C_4) alkyl group on groups in the last two mentioned carbamoyl groups is optionally substituted by hydroxy, (C_1-C_4) alkoxy or (C_1-C_4) alkoxycarbonyl), (C_2-C_4) alkenyl (optionally substituted by carboxy or (C_1-C_4) alkoxycarbonyl), (C_1-C_4) alkoxy, cyano, or nitro groups.

An example of this class of compounds is shown in formula (IIId)



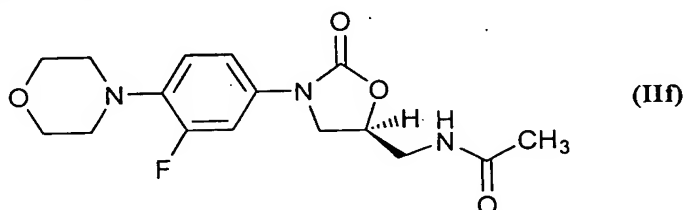
iii) International Patent Application No. WO 95/07271 discloses compounds of formula (IIe)



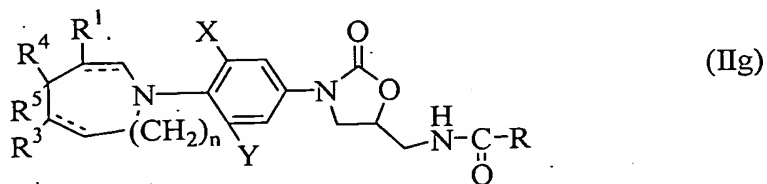
wherein X represents O, S, SO, SO $_2$, SNR 10 or SONR 10 ; R represents hydrogen, (C_1-C_3) alkyl optionally substituted with one or more of the following : F, Cl, hydroxy, $(C_1-$

C₈)alkoxy, (C₁-C₈)acyloxy or -OCH₂Ph or R represents (C₃-C₆)cycloalkyl, amino, (C₁-C₈)alkylamino, (C₁-C₈)dialkylamino or (C₁-C₈)alkoxy; R¹ represents hydrogen except when X is O, then R¹ can be hydrogen, CH₃, cyano, -CO₂H, CO₂R or (CH₂)_mR¹¹ (m is 1 or 2); R² represents independently hydrogen, F or Cl; R³ represents hydrogen or CH₃; R¹⁰ independently represents hydrogen, (C₁-C₄)alkyl (optionally substituted with chloro, fluoro, hydroxy, (C₁-C₈)alkoxy, amino, (C₁-C₈)alkylamino, or (C₁-C₈)dialkylamino) or p-toluenesulfonyl; R¹¹ represents hydrogen, hydroxy, OR, OCOR, NH₂, NHCOR or N(R¹⁰)₂; and n is 0, 1 or 2.

An example of this class of compounds is shown in formula (IIf)



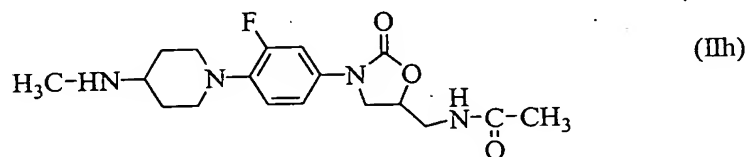
iv) International Patent Application WO 95/25106 discloses compounds of formula (IIg)



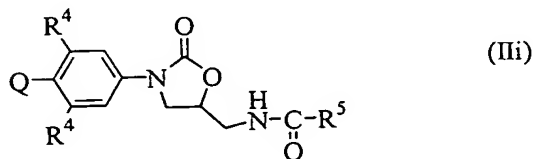
where R is hydrogen atom, (C₁-C₈)alkyl, (C₃-C₆)cycloalkyl, amino, (C₁-C₈)alkylamino, (C₁-C₈)dialkylamino, (C₁-C₈)alkoxy or (C₁-C₈)halogen alkyl; R¹ and R³ are each and independently represents hydrogen atom, halogen atom, (C₁-C₈)alkyl, (C₃-C₆)cycloalkyl, -(CH₂)_m-OR¹¹ or -C(=O)-R⁴¹; X and Y are each and independently represents hydrogen atom, halogen atom; R⁴ and R⁵ are each and independently represents hydrogen atom, (C₁-C₈)alkyl, (C₁-C₈)alkoxy, (C₁-C₈)alkylthio, -(CH₂)_m-OR⁵¹, -O-(CH₂)_m-OR⁵¹, -NR⁴²R⁵², -N=CH-NR⁴⁴R⁵⁵, -C(=O)-NR⁴²R⁵² or -(CH₂)_m-C(=A)-R⁴¹ or they may combine together to form =O, =NR⁴³, =S, =CR⁴⁴R⁵⁴ or an optionally substituted, unsaturated or saturated 5 or 6 membered hetero ring having 1-3 hetero atoms selected from the group consisting of a nitrogen atom, an oxygen atom and a

sulfur atom; R^{11} and R^{12} are each and independently represents hydrogen atom, (C₁-C₈)alkyl or methoxymethyl; R^{41} is hydrogen atom, $-(CH_2)_m-OH$, (C₁-C₈)alkyl, (C₁-C₈)alkoxy, $-O-CH_2-O-C(=O)-R^{11}$ or $-(CH_2)_m-C(=O)-OR^{11}$; R^{42} and R^{52} are each and independently represents hydrogen atom, $-(CH_2)_m-OR^{11}$, (C₁-C₈)alkyl, $-C(=O)-R^{41}$, $-C(=O)-NR^{11}R^{12}$, $-(CH_2)_p$ -phenyl, thiazol-2-yl or they may combine together to form a pyrrolidino group, a piperidino group, a piperazino group, a morpholino group or a thiomorpholino group, each of which may be substituted by (C₁-C₈)alkyl or $-(CH_2)_m-OH$; R^{43} is hydrogen atom, $-OR^{51}$, (C₁-C₈)alkyl, (C₁-C₈)alkoxy, $-(CH_2)_p$ -phenyl, $NR^{42}R^{52}$, $-NH-C(=NH)-NH_2$, [1,2,4]triazol-4-yl or cyano; R^{44} and R^{55} are each and independently represents hydrogen atom, (C₁-C₈)alkyl, $-C(=O)-R^{41}$ or $-(CH_2)_p$ -phenyl; R^{51} is hydrogen atom, (C₁-C₈)alkyl substituted by one or more hydroxy; (C₂-C₈)alkenyl, (C₁-C₈)halogenalkyl, $-(CH_2)_m-OR^{11}$, $-(CH_2)_m-C(=O)-R^{41}$, $-C(=O)-(CH_2)_m-OR^{44}$ or tosyl; A is oxygen atom or ethyleneketal; --- is a double bond or a simple bond; m's are each and independently 0, 1 or 2; n is 0 or 1; p's are each and independently 1, 2, 3 or 4;

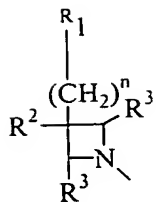
An example of this class of compounds is shown in formula (IIh)



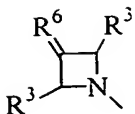
v) International Patent Application WO 96/13502 discloses compounds of formula (IIi)



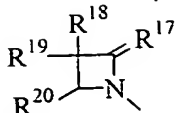
Q is selected from the structures (a), (b), (c), (d) and (e);



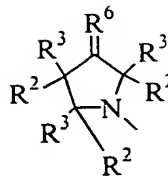
(a)



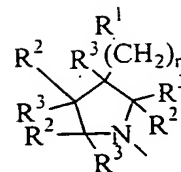
(b)



(c)



(d)

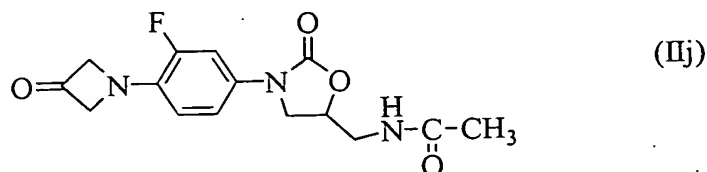


(e)

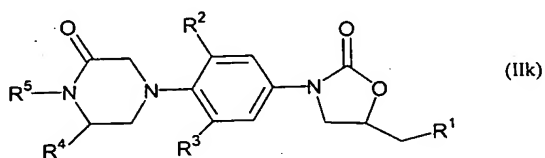
R^1 is H or F, OR^7 , SR^7 , NR^8R^9 , CN, (C_1-C_4) alkoxycarbonyl, carboxamide, (C_1-C_4) acyl optionally substituted with one or more of the following : fluorine, hydroxy, (C_1-C_4) alkoxy, (C_1-C_4) acyloxy; $NHO(C_1-C_6)$ alkyl or $NHOCH_2Ph$, NSO_2R where R is (C_1-C_6) alkyl optionally substituted with one or more F, Cl, (C_1-C_6) alkoxy or phenyl; R^2 is independently selected from hydrogen or fluorine, hydroxy, OR where R is (C_1-C_6) alkyl; (C_1-C_4) alkyl or Ph; R^3 is independently selected from H, phenyl, pyridyl or (C_1-C_3) alkyl which can be optionally substituted with F, Cl, hydroxy, (C_1-C_3) alkoxycarbonyl, (C_1-C_3) acyloxy, (C_1-C_3) alkoxy or $N(C_1-C_4)$ alkyl $_2$; R^4 is independently H, OCH_3 , F or Cl; R^5 is hydrogen, (C_1-C_8) alkyl optionally substituted with one or more of the following : F, Cl, hydroxy, (C_1-C_8) alkoxy, (C_1-C_8) acyloxy; (C_3-C_6) cycloalkyl, amino, (C_1-C_8) alkylamino, (C_1-C_8) dialkylamino, (C_1-C_8) alkoxy; R^6 is O, S, NR^{10} , $CR^{11}R^{12}$, $(OR)_2$, where R is (C_1-C_6) alkyl; $O(CH_2)_mO$, $(SR)_2$ where R is (C_1-C_6) alkyl; $S(CH_2)_mS$; R^7 is H, (C_1-C_8) alkyl optionally substituted with one or more of the following : F, Cl, -CN, OH, (C_1-C_8) alkoxy, (C_1-C_8) acyloxy, (C_1-C_8) alkoxycarbonyl, phenyl; (C_1-C_8) acyl optionally substituted with one or more of the following : hydroxy, (C_1-C_8) alkoxy, (C_1-C_8) acyloxy; (C_1-C_8) alkoxycarbonyl, carboxamide optionally substituted with a (C_1-C_4) alkyl or phenyl on the carboxamide nitrogen; phenyl, optionally substituted with one or more of the following : halogen, CN, (C_1-C_3) alkoxy, (C_1-C_3) alkoxycarbonyl, (C_1-C_4) alkyl optionally substituted with one or more of F or (C_1-C_3) alkoxy; R^8 and R^9 are independently selected from H, (C_1-C_8) alkyl optionally substituted with one or more of the following : F, Cl, -CN, OH, (C_1-C_8) alkoxy, (C_1-C_8) acyloxy, (C_1-C_8) alkoxycarbonyl, phenyl; (C_1-C_8) acyl optionally substituted with one or more of the following : hydroxy, (C_1-C_8) alkoxy, (C_1-C_8) acyloxy, amino, (C_1-C_4) acylamino, amino (C_1-C_4) acylamino; benzoyl optionally substituted with one or more of the following F, Cl, hydroxy, $(C_1-$

C₈)alkoxy, (C₁-C₈)acyloxy, amino, (C₁-C₄)acylamino, (C₁-C₄) alkoxycarbonylamino; (C₁-C₈)alkoxycarbonyl, benzyloxycarbonyl, tertbutoxycarbonyl; carboxamide optionally substituted with a (C₁-C₄)alkyl or phenyl on the carboxamide nitrogen; trifluoracetyl; CO(C₁-C₆ alkyl); R¹⁰ is H, OR⁷, NHR⁷, (C₁-C₈)alkyl optionally substituted with phenyl; R¹¹ and R¹² are independently selected from H, F, (C₁-C₄)alkyl optionally substituted with halogen, hydroxy, (C₁-C₄)alkoxy, (C₁-C₄)alkoxycarbonyl, phenyl; (C₁-C₈)acyl, (C₁-C₄)alkoxycarbonyl, CN; R¹⁷ is O or S; R¹⁸ and R¹⁹ are independently selected from H, (C₁-C₄)alkyl optionally substituted with halogen, hydroxy, (C₁-C₄)alkoxy; OH, (C₁-C₄)alkoxy optionally substituted with hydroxy or (C₁-C₄)alkoxy; NR⁸R⁹, -OC(O) (C₁-C₄)alkyl; R²⁰ is H, CH₃; n is 0 or 1; m is 2 or 3;

An example of this class of compounds is shown in formula (IIj)



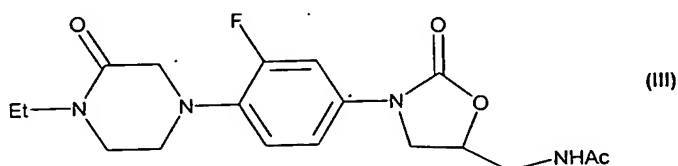
vi) International Patent Application WO 97/27188 discloses compounds of formula (II k)



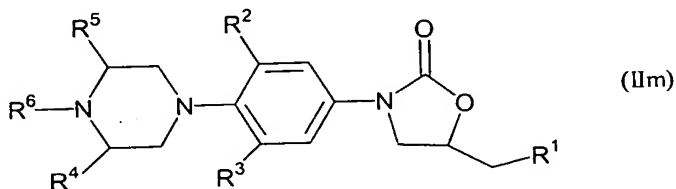
R¹ is of the formula -NHC(=O)(C₁-C₄)alkyl, -NHS(O)_n(C₁-C₄)alkyl, wherein n is 0, 1 or 2 or R¹ is hydroxy; R² and R³ are independently hydrogen or fluoro; R⁴ is hydrogen, methyl, ethyl or oxo; R⁵ is hydrogen, (C₁-C₆)alkyl, (C₂-C₆)alkenyl, (C₂-C₆)alkynyl, or of the formula R⁶(CH₂)_m wherein m is 1-4 and R⁶ is trifluoromethyl, difluoromethyl, fluoromethyl, (C₁-C₄)alkoxy, (C₁-C₄)alkyl, S(O)_p wherein p is 0, 1 or 2, (C₁-C₆)alkanoyloxy, di-(N-(C₁-C₄)alkyl)amino, N-((C₁-C₄)alkyl)(C₁-C₄)alkanoylamino, cyano, carboxy, (C₁-C₄)alkoxycarbonyl, carbamoyl, -di-(N-(C₁-C₄)alkyl)carbamoyl, N-((C₁-C₄)alkyl)(C₁-C₄)alkanesulphonamido, N¹-((C₁-C₄)alkyl)-di-(N³-(C₁-C₄)alkyl)ureido or of the formula -OC(=O)NR(R⁸) or N(R⁹)SO₂NR⁷(R⁸) wherein R⁷ and R⁸ are

independently hydrogen or (C₁-C₄)alkyl and R⁹ is (C₁-C₄)alkyl; or m is 2-4 and R⁶ is hydroxy, (C₁-C₄)alkanoylamino, amino, (C₁-C₄)alkylamino, (C₁-C₄)alkanesulphonamido, ureido, di-(N³-(C₁-C₄)alkyl)ureido or of the formula NH₂SO₂NR⁷(R⁸);

An example of this compound is shown in fig (III)

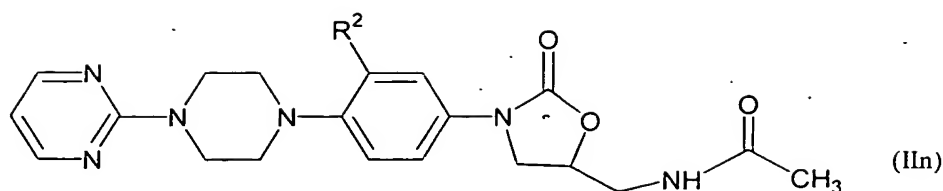


vii) International Patent Application WO 98/01446 discloses compounds of formula (IIm)



R¹ is of the formula -NHC(=O)R^a wherein R^a is (C₁-C₄)alkyl; R² and R³ are independently hydrogen or fluoro; R⁴ and R⁵ are independently hydrogen or methyl; R⁶ is a 6-membered heteroaryl ring containing 2 or 3 ring nitrogen atoms as the only ring heteroatoms and optionally substituted by substituents selected from (C₁-C₄)alkyl (optionally substituted), halo, trifluoromethyl, (C₁-C₄)alkylS(O)_n (wherein n is 0, 1 or 2), (C₁-C₄)alkylS(O)₂ amino, (C₁-C₄)alkanoylamino, carboxy, hydroxy, amino, (C₁-C₄)alkylamino, di(C₁-C₄)alkylamino, (C₁-C₄)alkoxycarbonyl, carbamoyl, N-(C₁-C₄)alkylcarbamoyl, -di-(N-(C₁-C₄)alkyl)carbamoyl, [wherein (C₁-C₄)alkyl group or groups in the last two mentioned carbamoyl substituents is optionally substituted by hydroxy, (C₁-C₄)alkoxy or (C₁-C₄)alkoxycarbonyl], (C₂-C₄)alkenyl (optionally substituted by carboxy or (C₁-C₄)alkoxycarbonyl), (C₁-C₄)alkoxy, cyano or nitro;

An example of this compound is shown in fig (IIIn)



Summary of the Invention

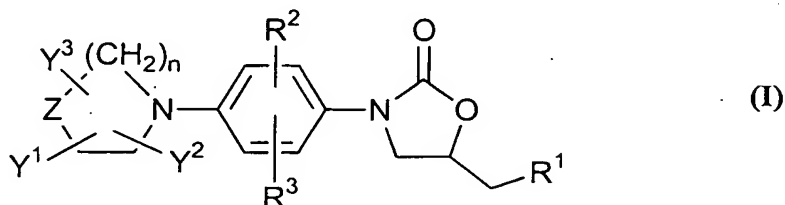
Considering the tremendous upsurge as well as the need in this area of medical research, we initiated a research program directed towards the discovery of novel antibacterial compounds effective against a number of human and veterinary pathogens, including gram-positive aerobic bacteria such as MRSA, streptococci and enterococci as well as anaerobic organisms such as *Bacteroides spp.*, *Clostridia spp.* species and acid-fast organisms such as *Mycobacterium tuberculosis*, *Mycobacterium avium* and *Mycobacterium spp.* Accordingly, we have identified phenyl oxazolidinones as one of the several other pharmacophores we have conceived in our laboratory to design novel analogues which may have potential antibacterial activity. Efforts in this direction have led to the preparation of compounds having general formula (I) as defined above.

The main objective of the present invention is therefore, to provide a process for the preparation of the new tricyclic oxazolidinones of the general formula (I) as defined above and their derivatives, their analogs, their tautomeric forms, their stereoisomers, their regioisomers, their polymorphs, their pharmaceutically acceptable salts, their pharmaceutically acceptable solvates and pharmaceutical compositions containing them, or their mixtures having enhanced activities, without toxic effect or with reduced toxic effect.

Yet another objective of the present invention is to provide process for the preparation of novel intermediates of formulae (III), (VIII), (X), (XIV), (XVII), (XVIII), (XX).

Detailed Description of the Invention

The present invention relates to a process for the preparation of oxazolidinones of the formula (I)



wherein R^1 represents halo, azido, thioalcohol, OR^4 , NHR^4 or $N(R^4)_2$, where R^4 represents hydrogen atom, or substituted or unsubstituted groups selected from acyl, thioacyl, alkoxycarbonyl, aryloxy carbonyl, alkoxythiocarbonyl, aryloxythiocarbonyl, $-C(=O)-C(=O)-alkyl$, $-C(=O)-C(=O)-aryl$, $-C(=O)-C(=O)-alkoxy$, $-C(=O)-C(=O)-aryloxy$, $-C(=S)-C(=S)-alkyl$, $-C(=S)-C(=S)-aryl$, $-C(=S)-C(=S)-alkoxy$, $-C(=S)-C(=S)-aryloxy$, or $S(O)_2(C_1-C_6)alkyl$; R^2 and R^3 may be same or different and independently represent hydrogen, halogen atom, $(C_1-C_6)alkyl$ group or haloalkyl; n represents an integer in the range of 1 to 3; when n represents 1, Z represents NH , S , O or $=CH$, Y^1 represents $=O$ or $=S$ group and Y^2 or Y^3 represents hydrogen, halogen, cyano, nitro, formyl, hydroxy, amino, $=O$, $=S$ group or substituted or unsubstituted groups selected from $(C_1-C_4)alkyl$, hydroxyalkyl, alkoxyalkyl, alkoxycarbonyl, carboxyalkyl, alkylsulfonyl, alkylcarbonylaminoalkyl, arylcarbonylaminoalkyl, alkylcarbonyloxyalkyl, aminoalkyl, alkylamino, arylamino, $(C_1-C_4)alkoxy$, aryl, aryloxy, aralkyl, heteroaryl, heteroaralkyl, heterocyclyl or heterocycloalkyl; when n represents 2 or 3; Z represents CH_2 , NH , S , O or $=CH$, Y^1 represents hydrogen, $=O$ or $=S$ group; Y^2 or Y^3 represents nitro, formyl, hydroxy, amino, $=O$, $=S$ group or substituted or unsubstituted groups selected from alkoxyalkyl, alkoxycarbonyl, carboxyalkyl, alkylsulfonyl, alkylcarbonylaminoalkyl, arylcarbonylaminoalkyl, alkylcarbonyloxyalkyl, aminoalkyl, alkylamino, arylamino, $(C_1-C_4)alkoxy$, aryl, aryloxy, aralkyl, heteroaryl, heteroaralkyl, heterocyclyl or heterocycloalkyl groups; any two of Y^1 , Y^2 and Y^3 when present on adjacent carbon atoms together form a 5-6 membered aromatic or non-aromatic cyclic structure, containing one or two hetero atoms.

Suitable groups represented by R^4 may be selected from hydrogen atom, (C_1 - C_7) acyl group such as $-C(=O)H$, $-C(=O)CH_3$, $-C(=O)CH_2CH_3$, $-C(=O)Ph$ and the like, the acyl group may be substituted; thio(C_1 - C_7)acyl group such as $-C(=S)H$, $-C(=S)CH_3$, $-C(=S)CH_2CH_3$, $-C(=S)Ph$ and the like, the thioacyl group may be substituted; alkoxycarbonyl group containing (C_1 - C_6)alkyl group which may be linear or branched such as methoxycarbonyl, ethoxycarbonyl, propoxycarbonyl and the like, the alkoxycarbonyl group may be substituted; aryloxycarbonyl group such as phenoxycarbonyl, benzyloxycarbonyl group and the like, the aryloxycarbonyl group may be substituted; alkoxythiocarbonyl group such as $CH_3O-C(=S)-$, $C_2H_5-C(=S)-$, $C_3H_7O-C(=S)-$ and the like, which may be substituted; aryloxythiocarbonyl group such as $PhO-C(=S)-$, $BzO-C(=S)-$ and the like, which may be substituted; $-C(=O)-C(=O)-$ alkyl group such as $-C(=O)-C(=O)methyl$, $-C(=O)-C(=O)ethyl$, $-C(=O)-C(=O)propyl$ and the like, which may be substituted; $-C(=O)-C(=O)-$ aryl group such as $-C(=O)-C(=O)phenyl$, $-C(=O)-C(=O)naphthyl$ and the like, which may be substituted; $-C(=O)-C(=O)-$ alkoxy group such as $-C(=O)-C(=O)methoxy$, $-C(=O)-C(=O)ethoxy$, $-C(=O)-C(=O)propyloxy$ and the like, which may be substituted; $-C(=O)-C(=O)-$ aryloxy group such as $-C(=O)-C(=O)phenyloxy$, $-C(=O)-C(=O)benzyloxy$ which may be substituted; $-C(=S)-C(=S)-$ alkyl group such as $-C(=S)-C(=S)methyl$, $-C(=S)-C(=S)ethyl$, $-C(=S)-C(=S)propyl$ and the like, which may be substituted; $-C(=S)-C(=S)-$ aryl group such as $-C(=S)-C(=S)phenyl$, $-C(=S)-C(=S)naphthyl$ and the like, which may be substituted; $-C(=S)-C(=S)-$ alkoxy group such as $-C(=S)-C(=S)methoxy$, $-C(=S)-C(=S)ethoxy$, $-C(=S)-C(=S)propyloxy$ and the like, which may be substituted; $-C(=S)-C(=S)-$ aryloxy group such as $-C(=S)-C(=S)phenyloxy$, $-C(=S)-C(=S)benzyloxy$, which may be substituted; $S(O)_2(C_1-C_6)alkyl$ group such as SO_2CH_3 , $SO_2C_2H_5$, $SO_2C_3H_7$, $SO_2CH(CH_3)CH_3$ and the like, which may be substituted.

When the groups represented by R^4 are substituted, the substituents may be selected from halogen atom such as chlorine, fluorine, bromine and iodine; hydroxy, cyano, nitro.

Suitable groups represented by R^2 and R^3 may be selected from hydrogen, halogen atom such as fluorine, chlorine or bromine; (C_1-C_6) alkyl group such as methyl, ethyl, n-propyl, isopropyl, n-butyl, iso-butyl, t-butyl, n-pentyl, iso-pentyl, n-hexyl and the like.

Suitable groups represented by Y^2 , when n is 1 are selected from hydrogen, halogen, cyano, nitro, formyl, hydroxy, amino, =O, =S group, substituted or unsubstituted (C_1-C_4) alkyl such as methyl, ethyl, n-propyl, isopropyl, n-butyl, iso-butyl, t-butyl and the like; hydroxy (C_1-C_6) alkyl; alkoxyalkyl group such as methoxymethyl, methoxyethyl, ethoxyethyl, ethoxymethyl, methoxypropyl, propoxymethyl, propoxy ethyl and the like which may be substituted alkoxycarbonyl group such as methoxycarbonyl, ethoxycarbonyl and the like, which may be substituted; (C_1-C_4) alkoxy group such as methoxy, ethoxy, propoxy, butoxy and the like, which may be substituted; carboxyalkyl such as CH_2-COOH , CH_2-CH_2-COOH and the like, which may be substituted; alkylsulfonyl group such as methylsulfonyl, ethylsulfonyl and the like, which may be substituted; alkylcarbonylaminoalkyl groups such as methylcarbonylaminomethyl, ethylcarbonylaminomethyl, methylcarbonylaminoethyl and the like, which may be substituted; arylcarbonylaminoalkyl such as phenylcarbonylaminomethyl, phenylcarbonylaminoethyl and the like, which may be substituted; alkylcarbonyloxyalkyl group such as methylcarbonyloxymethyl, ethylcarbonyloxyethyl, propylcarbonyloxymethyl, propylcarbonyloxyethyl, propylcarbonyloxypropyl and the like, which may be substituted; amino (C_1-C_6) alkyl such as aminomethyl, aminoethyl, aminopropyl and the like, which may be substituted; alkylamino such as methylamino, ethylamino, propylamino and the like, which may be substituted; arylamino such as phenylamino, benzylamino and the like, which may be substituted; aryl group such as phenyl, naphthyl and the like, which may be substituted; aryloxy group such as phenoxy, naphthyloxy and the like, the aryloxy group may be substituted; aralkyl such as benzyl, phenethyl, $C_6H_5CH_2CH_2CH_2$, naphthylmethyl and the like, the aralkyl group may be substituted; heteroaryl groups such as pyridyl, thienyl, furyl, pyrrolyl, oxazolyl, thiazolyl, pyrazolyl,

imidazolyl, oxadiazolyl, tetrazolyl, benzopyranyl, benzofuranyl and the like, which may be substituted; heteroaralkyl such as imidazolemethyl, imidazoleethyl, pyridylmethyl, furyl methyl, oxazolemethyl, imidazolyl and the like; heterocyclyl group such as pyrrolidine, piperidine, morpholine, piperazine and the like; heterocycloalkyl groups such as pyrrolidinemethyl, piperidinemethyl, morpholinemethyl, piperazinemethyl and the like.

Suitable groups represented by Y^2 , when n is 2 or 3 are selected from nitro, formyl, hydroxy, amino, =O, =S group; alkoxyalkyl group such as methoxymethyl, methoxyethyl, ethoxyethyl, ethoxymethyl, methoxypropyl, propoxymethyl, propoxyethyl and the like which may be substituted alkoxycarbonyl group such as methoxycarbonyl, ethoxycarbonyl and the like, which may be substituted; (C_1-C_4) alkoxy group such as methoxy, ethoxy, propoxy, butoxy and the like, which may be substituted; carboxyalkyl such as CH_2-COOH , CH_2-CH_2-COOH and the like, which may be substituted; alkylsulfonyl group such as methylsulfonyl, ethylsulfonyl and the like, which may be substituted; alkylcarbonylaminoalkyl groups such as methylcarbonylaminomethyl, ethylcarbonylaminomethyl, methylcarbonylaminoethyl and the like, which may be substituted; arylcarbonylaminoalkyl such as phenylcarbonylaminomethyl, phenylcarbonylaminoethyl and the like, which may be substituted; alkylcarbonyloxyalkyl group such as methylcarbonyloxymethyl, ethylcarbonyloxymethyl, methylcarbonyloxyethyl, propylcarbonyloxymethyl, propylcarbonyloxyethyl, propylcarbonyloxypropyl and the like, which may be substituted; amino(C_1-C_6)alkyl such as aminomethyl, aminoethyl, aminopropyl and the like, which may be substituted; alkylamino such as methylamino, ethylamino, propylamino and the like, which may be substituted; arylamino such as phenylamino, benzylamino and the like, which may be substituted; aryl group such as phenyl, naphthyl and the like, which may be substituted; aryloxy group such as phenoxy, naphthyloxy and the like, the aryloxy group may be substituted; aralkyl such as benzyl, phenethyl, $C_6H_5CH_2CH_2CH_2$, naphthylmethyl and the like, the aralkyl group may be substituted; heteroaryl groups such as pyridyl, thienyl, furyl, pyrrolyl, oxazolyl, thiazolyl, pyrazolyl,

imidazolyl, oxadiazolyl, tetrazolyl, benzopyranyl, benzofuranyl and the like, which may be substituted; heteroaralkyl such as imidazolemethyl, imidazoleethyl, pyridylmethyl, furyl methyl, oxazolemethyl, imidazolyl and the like; heterocyclyl such as pyrrolidine, piperidine, morpholine, piperazine and the like; heterocycloalkyl group such as pyrrolidinemethyl, piperidinemethyl, morpholinemethyl, piperazinemethyl and the like. When the groups represented by Y^2 are substituted, the substituents may be selected from hydroxy, nitro, cyano, amino, halogen atom such as fluorine, chlorine or bromine; alkyl group such as methyl, ethyl, isopropyl, n-propyl, n-butyl and the like; cycloalkyl group such as cyclopropyl and the like; aryl group such as phenyl; aralkyl group such as benzyl; (C_1-C_3) alkoxy, benzyloxy, acyl or acyloxy groups.

Suitable cyclic structure formed by any two of Y^1 , Y^2 and Y^3 together with the carbon atoms to which they are attached may be selected from benzene, pyridine, pyrrolidine, furan, thiophene, morpholine, piperazine, pyrrole and the like;

Pharmaceutically acceptable salts forming part of this invention include salts derived from inorganic bases such as Li, Na, K, Ca, M, Fe, Cu, Zn, Mn; salts of organic bases such as N,N'-diacetylenediamine, betaine, caffeine, 2-diethylaminoethanol, 2-dimethylaminoethanol, N-ethylmorpholine, N-ethylpiperidine, glucamine, glucosamine, hydrabamine, isopropylamine, methylglucamine, morpholine, piperazine, piperidine, procaine, purines, theobromine, triethylamine, trimethylamine, tripropylamine, tromethamine, diethanolamine, meglumine, ethylenediamine, N,N'-diphenylethylenediamine, N,N'-dibenzylethylenediamine, N-benzyl phenylethylamine, choline, choline hydroxide, dicyclohexylamine, benzylamine, phenylethylamine, dialkylamine, trialkylamine, thiamine, aminopyrimidine, aminopyridine, purine, spermidine, and the like; chiral bases like alkylphenylamine, glycinol, phenyl glycinol and the like, salts of natural amino acids such as glycine, alanine, valine, leucine, isoleucine, norleucine, tyrosine, cystine, cysteine, methionine, proline, hydroxy proline, histidine, ornithine, lysine, arginine, serine, threonine, phenylalanine; unnatural amino

acids such as D-isomers or substituted amino acids; metformin, guanidine, substituted guanidine wherein the substituents are selected from nitro, amino, alkyl, alkenyl, alkynyl, ammonium or substituted ammonium salts and aluminum salts. Salts may include acid addition salts where appropriate which are, sulphates, nitrates, phosphates, perchlorates, borates, hydrohalides, acetates, tartrates, maleates, citrates, succinates, palmoates, methanesulphonates, benzoates, salicylates, hydroxynaphthoates, benzenesulfonates, ascorbates, glycerophosphates, ketoglutarates and the like. Pharmaceutically acceptable solvates may be hydrates or comprising other solvents of crystallization such as alcohols.

Representative compounds prepared according to the process of the present invention include:

(RS)-N-{3-[3-Fluoro-4-(2-oxo-4-morpholinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}acetamide ;

(R)-N-{3-[3-Fluoro-4-(2-oxo-4-morpholinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}acetamide ;

(S)-N-{3-[3-Fluoro-4-(2-oxo-4-morpholinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}acetamide ;

(RS)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}acetamide ;

(R)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}acetamide ;

(S)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}acetamide;

(RS)-N-{3-[4-(3-Benzyl-4-oxo-1-imidazolidinyl)-3-fluorophenyl]-2-oxo-5-oxazolidinylmethyl}acetamide ;

(R)-N-{3-[4-(3-Benzyl-4-oxo-1-imidazolidinyl)-3-fluorophenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[4-(3-Benzyl-4-oxo-1-imidazolidinyl)-3-fluorophenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(RS)-N-{3-[3-Fluoro-4-(3-methyl-2-oxo-1-imidazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[3-Fluoro-4-(3-methyl-2-oxo-1-imidazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[3-Fluoro-4-(3-methyl-2-oxo-1-imidazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(RS)-N-{3-[4-(3-Benzyl-2-oxo-1-imidazolidinyl)-3-fluorophenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[4-(3-Benzyl-2-oxo-1-imidazolidinyl)-3-fluorophenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[4-(3-Benzyl-2-oxo-1-imidazolidinyl)-3-fluorophenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(RS)-N-{3-[3-Fluoro-4-(2-oxo-1,3-oxazinan-3-yl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[3-Fluoro-4-(2-oxo-1,3-oxazinan-3-yl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[3-Fluoro-4-(2-oxo-1,3-oxazinan-3-yl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(RS)-N-{3-[3-Fluoro-4-(3-methyl-4-oxo-1-imidazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[3-Fluoro-4-(3-methyl-4-oxo-1-imidazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide;

(S)-N-{3-[3-Fluoro-4-(3-methyl-4-oxo-1-imidazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(RS)-N-{3-[3-Fluoro-4-(2-thioxo-4-morpholinyl)phenyl]-2-oxo-5-oxazolidinylmethy} acetamide ;

(R)-N-{3-[3-Fluoro-4-(2-thioxo-4-morpholinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[3-Fluoro-4-(2-thioxo-4-morpholinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(RS)-N-{3-[3-Fluoro-4-(3-methylsulfonyl-2-oxo-1-imidazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[3-Fluoro-4-(3-methylsulfonyl-2-oxo-1-imidazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[3-Fluoro-4-(3-methylsulfonyl-2-oxo-1-imidazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(RS)-N-{3-[4-(5-Methylcarboxamidomethyl-2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[4-(5-Methylcarboxamidomethyl-2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[4-(5-Methylcarboxamidomethyl-2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide

(RS)-N-{3-[4-(3-Benzyl-4-thioxo-1-imidazolidinyl)-3-fluorophenyl]-2-oxo-5-oxazolidinylmethyl} acetamide;

(R)-N-{3-[4-(3-Benzyl-4-thioxo-1-imidazolidinyl)-3-fluorophenyl]-2-oxo-5-oxazolidinylmethyl} acetamide;

(S)-N-{3-[4-(3-Benzyl-4-thioxo-1-imidazolidinyl)-3-fluorophenyl]-2-oxo-5-oxazolidinylmethyl} acetamide;

(RS)-N-{3-[3-Fluoro-4-(5-methylcarboxamidomethyl-2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[3-Fluoro-4-(5-methyl-2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[3-Fluoro-4-(5-methyl-2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide;

(RS)-N-{3-[2-Fluoro-4-(5-methylcarboxamidomethyl-2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide;

(R)-N-{3-[2-Fluoro-4-(5-methylcarboxamidomethyl-2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[2-Fluoro-4-(5-methylcarboxamidomethyl-2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(RS)-N-{3-[3-Fluoro-4-(4-oxo-3-(2-pyridyl)-1-imidazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[3-Fluoro-4-(4-oxo-3-(2-pyridyl)-1-imidazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[3-Fluoro-4-(4-oxo-3-(2-pyridyl)-1-imidazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(RS)-N-{3-[3-Fluoro-4-(3-(4-methoxybenzyl)-4-oxo-1-imidazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[3-Fluoro-4-(3-(4-methoxybenzyl)-4-oxo-1-imidazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}acetamide ;

(S)-N-{3-[3-Fluoro-4-(3-(4-methoxybenzyl)-4-oxo-1-imidazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}acetamide ;

(RS)-N-{3-[4-(3-Ethyl-4-oxo-1-imidazolidinyl)-3-Fluorophenyl]-2-oxo-5-oxazolidinylmethyl}acetamide ;)

(R)-N-{3-[4-(3-Ethyl-4-oxo-1-imidazolidinyl)-3-Fluorophenyl]-2-oxo-5-oxazolidinylmethyl}acetamide ;

(S)-N-{3-[4-(3-Ethyl-4-oxo-1-imidazolidinyl)-3-Fluorophenyl]-2-oxo-5-oxazolidinylmethyl}acetamide ;

(RS)-5-Hydroxymethyl-3-[4-(2-oxo-3-oxazolidinyl)phenyl]-oxazolidin-2-one.

(R)-5-Hydroxy methyl-3-[4-(2-oxo-3-oxazolidinyl)phenyl]-oxazolidin-2-one.

(S)-5-Hydroxy methyl-3-[4-(2-oxo-3-oxazolidinyl)phenyl]-oxazolidine-2-one.

(RS)-5-Azidomethyl-3-[4-(2-oxo-3-oxazolidinyl)phenyl]-oxazolidine-2-one.

(R)-5-Azidomethyl-3-[4-(2-oxo-3-oxazolidinyl)phenyl]-oxazolidine-2-one

(S)-5-Azidomethyl-3-[4-(2-oxo-3-oxazolidinyl)phenyl]-oxazolidine-2-one

(RS)-N-{2-oxo-3-[4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}acetamide;

(R)-N-{2-oxo-3-[4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}acetamide;

(S)-N-{2-oxo-3-[4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}acetamide;

(RS)-{2-oxo-3-[4-(2-oxo-3-oxazolidinyl)phenyl]-5-oxazolidinylmethyl}methanesulfonate ;

(R)-{2-oxo-3-[4-(2-oxo-3-oxazolidinyl)phenyl]-5-oxazolidinylmethyl}methanesulfonate;

(S)-{2-oxo-3-[4-(2-oxo-3-oxazolidinyl)phenyl]-5-oxazolidinylmethyl}
 methanesulfonate;
 (RS)-3-[2-Fluoro-4-(5-hydroxymethyl-2-oxo-3-oxazolidinyl)phenyl]-2,3-dihydrobenzo-
 [d]oxazolidin-2-one;
 (R)-3-[2-Fluoro-4-(5-hydroxymethyl-2-oxo-3-oxazolidinyl)phenyl]-2,3-dihydrobenzo-
 [d]oxazolidin-2-one;
 (S)-3-[2-Fluoro-4-[5-hydroxymethyl-2-oxo-3-oxazolidinyl]phenyl]-2,3-dihydrobenzo-
 [d] oxazolidin-2-one;
 (RS)-N-{3-[3-Fluoro-4-(2-oxo-2,3-dihydrobenzo-[d]oxazolidin-3-yl)phenyl]-2-oxo-5-
 oxazolidinylmethyl} acetamide ;
 (R)-N-{3-[3-Fluoro-4-(2-oxo-2,3-dihydrobenzo-[d]oxazolidin-3-yl)phenyl]-2-oxo-5-
 oxazolidinyl methyl} acetamide ;
 (S)-N-{3-[3-Fluoro-4-(2-oxo-2,3-dihydrobenzo-[d]oxazolidin-3-yl)phenyl]-2-oxo-5-
 oxazolidinylmethyl} acetamide ;
 (RS)-N-{3-[3-Fluoro-4-(2-thioxo-3-oxazolidinyl)phenyl]-2-oxo-5-
 oxazolidinylmethyl} acetamide ;
 (R)-N-{3-[3-Fluoro-4-(2-thioxo-3-oxazolidinyl)phenyl]-2-oxo-5-
 oxazolidinylmethyl} acetamide ;
 (S)-N-{3-[3-Fluoro-4-(2-thioxo-3-oxazolidinyl)phenyl]-2-oxo-5-
 oxazolidinylmethyl} acetamide ;
 (RS)-N-{3-[3-Fluoro-4-(2-thioxo-3-oxazolidinyl)phenyl]-5-hydroxymethyl}-2-
 oxazolidinone;
 (R)-N-{3-[3-Fluoro-4-(2-thioxo-3-oxazolidinyl)phenyl]-5-hydroxymethyl}-2-
 oxazolidinone;
 (S)-N-{3-[3-Fluoro-4-(2-thioxo-3-oxazolidinyl)phenyl]-5-hydroxymethyl}-2-
 oxazolidinone;

(RS)-N-{3-[3-Fluoro-4-(2-thioxo-3-thiazolidinyl)phenyl]-5-hydroxymethyl}-2-oxazolidinone;

(R)-N-{3-[3-Fluoro-4-(2-thioxo-3-thiazolidinyl)phenyl]-5-hydroxymethyl}-2-oxazolidinone;

(S)-N-{3-[3-Fluoro-4-(2-thioxo-3-thiazolidinyl)phenyl]-5-hydroxymethyl}-2-oxazolidinone;

(RS)-N-{3-[3-Fluoro-4-(2-thioxo-3-thiazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[3-Fluoro-4-(2-thioxo-3-thiazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[3-Fluoro-4-(2-thioxo-3-thiazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(RS)-N-{3-[3-Fluoro-4-(4-methoxymethoxymethyl-2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[3-Fluoro-4-(4-methoxymethoxymethyl-2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide;

(S)-N-{3-[3-Fluoro-4-(4-methoxymethoxymethyl-2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide;

(RS)-3-[4-(5-Aminomethyl-2-oxo-3-oxazolidinyl)-2-fluorophenyl]-4-hydroxymethyl-3-oxazolidin-2-one;

(R)-3-[4-(5-Aminomethyl-2-oxo-3-oxazolidinyl)-2-fluorophenyl]-4-hydroxymethyl-3-oxazolidin-2-one;

(S)-3-[4-(5-Aminomethyl-2-oxo-3-oxazolidinyl)-2-fluorophenyl]-4-hydroxymethyl-3-oxazolidin-2-one;

(RS)-{3-[4-(4-Benzyloxymethyl-2-oxo-3-oxazolidinyl)-3-fluorophenyl]-2-oxo-5-oxazolidinylmethyl} butyrate;

(R)-{3-[4-(4-Benzyloxymethyl-2-oxo-3-oxazolidinyl)-3-fluorophenyl]-2-oxo-5-oxazolidinylmethyl} butyrate;

(S)-{3-[4-(4-Benzyloxymethyl-2-oxo-3-oxazolidinyl)-3-fluorophenyl]-2-oxo-5-oxazolidinylmethyl} butyrate;

(RS)-N-{3-[4-(4-Benzyloxymethyl-2-oxo-3-oxazolidinyl)-3-fluorophenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[4-(4-Benzyloxymethyl-2-oxo-3-oxazolidinyl)-3-fluorophenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[4-(4-benzyloxymethyl-2-oxo-3-oxazolidinyl)-3-fluorophenyl]-2-oxo-5-oxazolidinylmethyl} acetamide;

(RS)-N-{3-[3-Fluoro-4-(4-hydroxymethyl-2-oxo-3-oxazolidinylphenyl)-2-oxo-4-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[3-Fluoro-4-(4-hydroxymethyl-2-oxo-3-oxazolidinylphenyl)-2-oxo-4-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[3-Fluoro-4-(4-hydroxymethyl-2-oxo-3-oxazolidinylphenyl)-2-oxo-4-oxazolidinylmethyl} acetamide ;

(RS)-N-{3-[2-Fluoro-5-(5-methylcarboxamidomethyl-2-oxo-3-oxazolidinylphenyl)-2-oxo-4-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[2-Fluoro-5-(5-methylcarboxamidomethyl-2-oxo-3-oxazolidinylphenyl)-2-oxo-4-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[2-Fluoro-5-(5-methylcarboxamidomethyl-2-oxo-3-oxazolidinylphenyl)-2-oxo-4-oxazolidinylmethyl} acetamide ;

(RS)-[2-Fluoro-4-(5-methylcarboxamidomethyl-2-oxo-3-oxazolidinylphenyl)-2-oxo-4-oxazolidinylmethyl-2-chloroacetate ;

(R)-[2-Fluoro-4-(5-methylcarboxamidomethyl-2-oxo-3-oxazolidinylphenyl)-2-oxo-4-oxazolidinylmethyl-2-chloroacetate ;

(S)-[2-Fluoro-4-(5-methylcarboxamidomethyl-2-oxo-3-oxazolidinylphenyl]-2-oxo-4-oxazolidinylmethyl-2-chloroacetate ;

(RS)-3-[2-Fluoro-4-(5-methylcarboxamidomethyl-2-oxo-3-oxazolidinylphenyl]-2-oxo-4-oxazolidinylmethyl-2,2-difluoroacetate ;

(R)-3-[2-Fluoro-4-(5-methylcarboxamidomethyl-2-oxo-3-oxazolidinylphenyl]-2-oxo-4-oxazolidinylmethyl-2,2-difluoroacetate ;

(S)-3-[2-Fluoro-4-(5-methylcarboxamidomethyl-2-oxo-3-oxazolidinylphenyl]-2-oxo-4-oxazolidinylmethyl-2,2-difluoroacetate ;

(RS)-N-{3-[3-Fluoro-4-(4-morpholinomethyl-2-oxo-3-oxazolidinylphenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[3-Fluoro-4-(4-morpholinomethyl-2-oxo-3-oxazolidinylphenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[3-Fluoro-4-(4-morpholinomethyl-2-oxo-3-oxazolidinylphenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(RS)-N-{3-[3-Fluoro-4-(6-methyl-2-oxo-2,3-dihydrobenzo[d]oxazolidin-3-ylphenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[3-Fluoro-4-(6-methyl-2-oxo-2,3-dihydrobenzo[d]oxazolidin-3-ylphenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(S)-N-{3-[3-Fluoro-4-(6-methyl-2-oxo-2,3-dihydrobenzo[d]oxazolidin-3-ylphenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(RS)-N-{3-[3-Fluoro-4-(5-methyl-2-oxo-2,3-dihydrobenzo[d]oxazolidin-3-ylphenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;

(R)-N-{3-[3-Fluoro-4-(6-methyl-2-oxo-2,3-dihydrobenzo[d] oxazolidin-3-yl phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide;

(S)-N-{3-[3-Fluoro-4-(6-methyl-2-oxo-2,3-dihydrobenzo[d]oxazolidin-3-ylphenyl]-2-oxo-5-oxazolidinylmethyl} acetamide;

(RS)-3-[2-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-5-hydroxymethyl-oxazolidin-2-one ;
 (R)-3-[2-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-5-hydroxymethyl-oxazolidin-2-one ;
 (S)-3-[2-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-5-hydroxymethyl-oxazolidin-2-one ;
 (RS)-N-{3-[3-Fluoro-4-(5-hydroxymethyl-2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}acetamide ;
 (R)-N-3-{3-Fluoro-4-(5-hydroxymethyl-2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;
 (S)-N-{3-[3-Fluoro-4-(5-hydroxymethyl-2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;
 (RS)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;
 (R)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;
 (S)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;
 (RS)-N-{3-[3,5-Difluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;
 (R)-N-{3-[3,5-Difluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;
 (S)-N-{3-[3,5-Difluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl} acetamide ;
 (RS)-3-[3,5-Difluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-5-hydroxymethyl-1,3-oxazolidine-2-one;
 (R)-3-[3,5-Difluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-5-hydroxymethyl-1,3-oxazolidine-2-one;
 (S)-3-[3,5-Difluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-5-hydroxymethyl-1,3-oxazolidine-2-one;

(RS)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}
butanamide ;

(R)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}
butanamide ;

(S)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}
butanamide ;

(RS)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}
hexanamide ;

(R)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}
hexanamide ;

(S)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}
hexanamide ;

(RS)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}
acetamide ;

(R)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}
acetamide;

(S)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}
acetamide;

(RS)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}
heptanamide;

(R)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}
heptanamide;

(S)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}
heptanamide;

(RS)-N-{3-[4-(2-Oxo-3-oxazolidinyl)-3-trifluoromethylphenyl]-2-oxo-5-
oxazolidinylmethyl} acetamide;

(R)-N-{3-[4-(2-Oxo-3-oxazolidinyl)-3-trifluoromethylphenyl]-2-oxo-5-oxazolidinylmethyl} acetamide;

(S)-N-{3-[4-(2-Oxo-3-oxazolidinyl)-3-trifluoromethylphenyl]-2-oxo-5-oxazolidinylmethyl} acetamide;

(RS)-3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-5-(1-thioxoethylaminomethyl)-2-oxazolidinone;

(R)-3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-5-(1-thioxoethylaminomethyl)-2-oxazolidinone;

(S)-3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-5-(1-thioxoethylaminomethyl)-2-oxazolidinone;

(RS)-N-{3-[4-(2-Oxo-3-oxazolidinyl)-3-trifluoromethylphenyl]-2-oxo-5-oxazolidinylmethyl} propanamide;

(R)-N-{3-[4-(2-Oxo-3-oxazolidinyl)-3-trifluoromethylphenyl]-2-oxo-5-oxazolidinylmethyl} propanamide;

(S)-N-{3-[4-(2-Oxo-3-oxazolidinyl)-3-trifluoromethylphenyl]-2-oxo-5-oxazolidinylmethyl} propanamide;

(RS)-5-Aminomethyl-3-[4-(2-oxo-3-oxazolidinyl)-3-trifluoromethylphenyl]-2-oxazolidinone.hydrochloride;

(R)-5-Aminomethyl-3-[4-(2-oxo-3-oxazolidinyl)-3-trifluoromethylphenyl]-2-oxazolidinone.hydrochloride;

(S)-5-Aminomethyl-3-[4-(2-oxo-3-oxazolidinyl)-3-trifluoromethylphenyl]-2-oxazolidinone.hydrochloride;

(RS)-N{3-[4-(2-oxo-3-oxazolidinyl)-3-trifluoromethylphenyl]-2-oxo-5-oxazolidinylmethyl} heptanamide;

(R)-N-{3-[4-(2-Oxo-3-oxazolidinyl)-3-trifluoromethylphenyl]-2-oxo-5-oxazolidinylmethyl} heptanamide;

(S)-N-{3-[4-(2-Oxo-3-oxazolidinyl)-3-trifluoromethylphenyl]-2-oxo-5-oxazolidinylmethyl} heptanamide;
 (RS)-N-{3-[4-(2-Oxo-3-oxazolidinyl)-3-trifluoromethylphenyl]-2-oxo-5-oxazolidinylmethyl} acrylamide;
 (R)-N-{3-[4-(2-Oxo-3-oxazolidinyl)-3-trifluoromethylphenyl]-2-oxo-5-oxazolidinylmethyl} acrylamide;
 (S)-N-{3-[4-(2-Oxo-3-oxazolidinyl)-3-trifluoromethylphenyl]-2-oxo-5-oxazolidinylmethyl} acrylamide;
 (RS)-3-[4-(2-Oxo-3-oxazolidinyl)phenyl]-5-(1-thioxoethylaminomethyl)-2-oxazolidinone;
 (R)-3-[4-(2-Oxo-3-oxazolidinyl)phenyl]-5-(1-thioxoethylaminomethyl)-2-oxazolidinone;
 (S)-3-[4-(2-Oxo-3-oxazolidinyl)phenyl]-5-(1-thioxoethylaminomethyl)-2-oxazolidinone;
 (RS)-5-Aminomethyl-3-[3-fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxazolidinone;
 (R)-5-Aminomethyl-3-[3-fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxazolidinone;
 (S)-5-Aminomethyl-3-[3-fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxazolidinone;
 (RS)-5-Aminomethyl-3-[3-fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxazolidinone hydrochloride;
 (R)-5-Aminomethyl-3-[3-fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxazolidinone hydrochloride.;
 (S)-5-Aminomethyl-3-[3-fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxazolidinone hydrochloride;
 (RS)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}-2-hydroxyacetamide;
 (R)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}-2-hydroxyacetamide;

(S)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}-2-hydroxyacetamide;

(RS)-3-[2-Fluoro-4-(2-oxo-5-(1-thioxoethylaminomethyl)-3-oxazolidinyl)phenyl]-2,3-dihydrobenzo[d]-2-oxazolidinone;

(R)-3-[2-Fluoro-4-(2-oxo-5-(1-thioxoethylaminomethyl)-3-oxazolidinyl)phenyl]-2,3-dihydrobenzo[d]-2-oxazolidinone;

(S)-3-[2-Fluoro-4-(2-oxo-5-(1-thioxoethylaminomethyl)-3-oxazolidinyl)phenyl]-2,3-dihydrobenzo[d]-2-oxazolidinone;

(RS)-3-[2-Fluoro-4-(2-oxo-5-(1-thioxoethylaminomethyl)-3-oxazolidinyl)phenyl]-2,3-dihydrobenzo[d]-2-oxazolidinone;

(RS)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}-2,2,2-trifluoroacetamide;

(R)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}-2,2,2-trifluoroacetamide;

(S)-N-[3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl]-2,2,2-trifluoroacetamide;

(RS)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}-methanamide;

(R)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}-methanamide;

(S)-N-{3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethyl}methanamide;

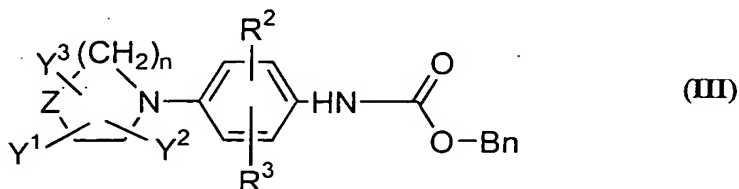
(RS)-Ethyl-3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethylcarbamoyl methanoate;

(R)-Ethyl-3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethylcarbamoyl methanoate;

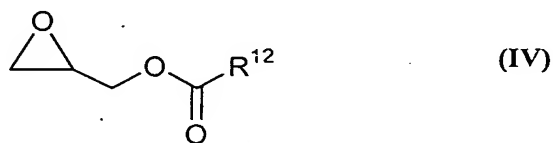
(S)-Ethyl-3-[3-Fluoro-4-(2-oxo-3-oxazolidinyl)phenyl]-2-oxo-5-oxazolidinylmethylcarbamoyl methanoate;

Accordingly, the present invention provides a process for the preparation of the compounds of formula (I) where all the symbols are as defined earlier which comprises :

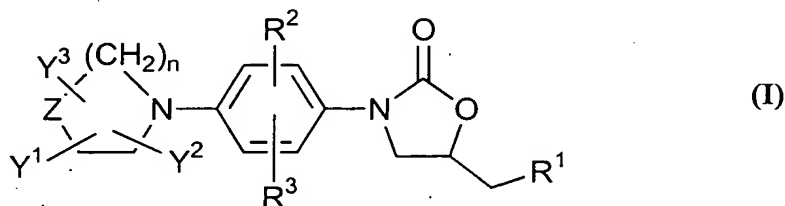
- (i) reacting the compound of formula (III)



where Bn represents benzyl and all other symbols are as defined above with a compound of formula (IV)



where R^{12} represents a (C_1-C_3) alkyl group such as methyl, ethyl or propyl in the presence of a base to produce a compound of formula (I)



where R^1 represents hydroxy and all symbols are as defined earlier,

- (ii) if, desired, converting the compound of formula (I) where R^1 represents hydroxy group to a compound of formula (I) where R^1 represents NHR^4 or $N(R^4)_2$, by conventional methods.

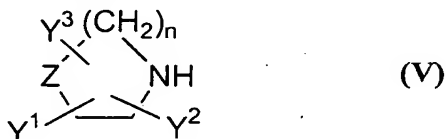
The reaction of a compound of formula (III) with a compound of formula (IV) to produce a compound of formula (I) defined above may be carried out in the presence of a base such as alkali metal hydrides like NaH, or KH or organolithiums like CH_3Li , BuLi, LDA and the like or alkoxides such as NaOMe, NaOEt, t-BuOK or mixtures thereof. The reaction may be carried out in the presence of solvents such as THF, dioxane, DMF, DMSO, DME and the like or mixtures thereof. HMPA may be used as

cosolvent. The reaction temperature may range from -78 °C to 150 °C, preferably at a temperature in the range of -10 °C to 30 °C.

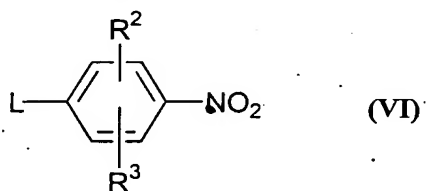
The conversion of a compound of formula (I) where R¹ represents hydroxy to a compound of formula (I) defined above may be carried out in the presence of an amine or amide of formula NH₂R⁴ or NH(R⁴)₂ under Mitsunobu conditions using tri-n-butylphosphine, 1,1'-(azodicarbonyl)dipiperidine (ADDP) or diethyl azadicarboxylate (DEAD) in an organic solvent such as THF, DMF, DMSO and the like or mixtures thereof. The reaction may be carried out at a temperature in the range of 0 °C to 60 °C, preferably at ambient temperature. The reaction time may range from 0.5 h to 48 h, preferably from 1 to 24 h.

In still another embodiment of the present invention there is provided another process for the preparation compound of formula (I) defined above, which comprises :

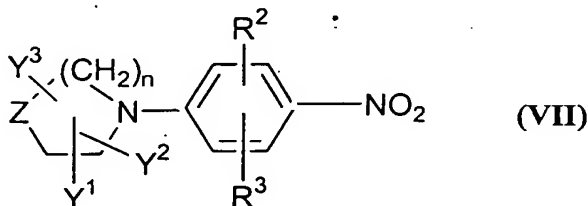
- (i) reacting a compound of formula (V)



where all symbols are as defined above with a compound of formula (VI)

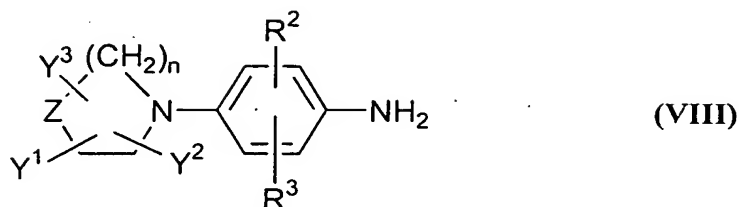


where L represents halogen atom and all other symbols are as defined above to produce a compound of formula (VII)



where all symbols are as defined above,

- (ii) reducing the compound of formula (VII) to produce a compound of formula (VIII)

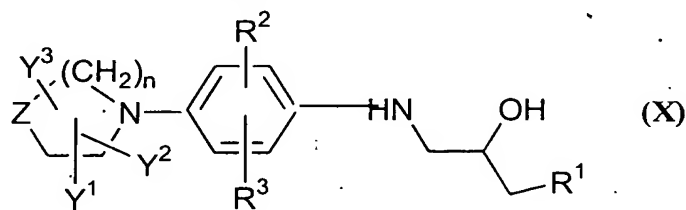


where all symbols are as defined above,

- (iii) reacting the compound of formula (VIII) with a compound of formula (IX)



where R¹ is as defined earlier to produce a compound of formula (X)



where all symbols are as defined above, and

- (iv) carbonylating the compound of formula (X) with a suitable carbonylating agent to produce the compound of formula (I) where all symbols are as defined above.

The reaction of a compound of formula (V) with a compound of formula (VI) to produce a compound of formula (VII) may be carried out using a base such as KOH, NaOH, K₂CO₃, Na₂CO₃, triethylamine, diisopropylethyl amine and the like. The reaction may be carried out using a solvent such as DMSO, DMF, acetonitrile, chloroform and the like or mixtures thereof. The reaction may be carried out in inert atmosphere, which may be maintained using inert gases such as N₂, Ar or He. The reaction may be carried out at a temperature in the range of 40 °C - 100 °C, preferably at a temperature in the range of 40 °C - 80 °C. The reaction time may range from 4 to 15 h, preferably from 6 to 12 h.

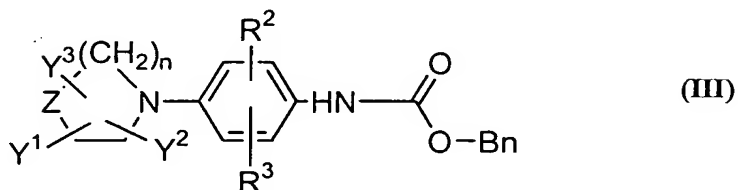
The reduction of a compound of formula (VII) to produce a compound of formula (VIII) may be carried out in the presence of gaseous hydrogen and a catalyst such as Pd/C, Rh/C, Pt/C and the like. Mixtures of catalyst may be used. The reduction may be conducted in the presence of solvents such as dioxane, acetic acid, ethyl acetate, alcohol such as methanol, ethanol and the like. A pressure between atmospheric pressure to 60 psi may be used. The reaction may be carried out at a temperature from 25 °C to 60 °C, preferably at room temperature. The reaction time ranges from 6 to 12 h. The reduction may also be carried out employing metal in mineral acids such tin in HCl, iron in HCl, Zn/HCl, Zn/CH₃CO₂H and the like.

The reaction of a compound of formula (VIII) defined above with a compound of formula (IX) defined above to produce a compound of formula (X) may be carried out in the presence or absence of a base such as K₂CO₃, NaH, t-BuOK and the like or mixtures thereof. The reaction may be carried out in the presence of solvents such as DMF, THF, CH₃CN, alcohol like methanol, ethanol or isopropanol and the like or mixtures thereof. The reaction may also be carried out in the presence of Lewis acids such as BF₃.OEt₂, ZnCl₂, Ti(OiPr)₄, lanthanide metal complexes and the like in the presence of DCE, DMF, THF and the like or mixtures thereof. The reaction temperature may be in the range of 30 °C to 120 °C, preferably at a temperature in the range of 30 °C to 100 °C. The reaction time may range from 3 to 24 h, preferably from 4 to 12 h.

The conversion of compound of formula (X) to a compound of formula (I) may be carried out using a carbonylating agent such as dialkyl carbonate, dihalo carbonate, 1,1'-carbonyldiimidazole and the like in the presence of a base. The base may be selected from triethylamine, tributylamine, diisopropylethylamine, DABCO, DBU, DBN, alkoxides like NaOMe, NaOEt and the like or the inorganic bases such as NaOH, KOH and the like. The reaction may be carried out in the presence of solvents such as dichloromethane, THF, DMF, ethyl acetate, isopropanol and the like or mixtures thereof. The reaction temperature may be in the range of -20 °C to 50 °C, preferably at a temperature in the range of 15 °C to 30 °C. The reaction time may range from 2 to 72 hours, preferably from 2 to 50 hours.

In still another embodiment of the present invention there is provided yet another process for the preparation of compound of the formula (I) defined above which comprises ;

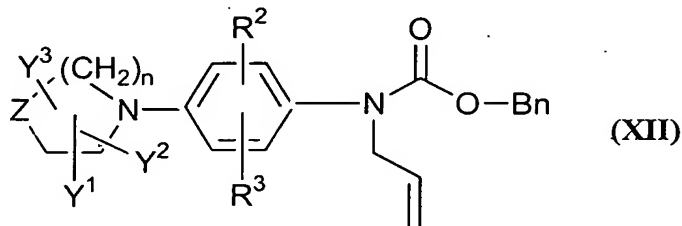
- (i) reacting a compound of formula (III)



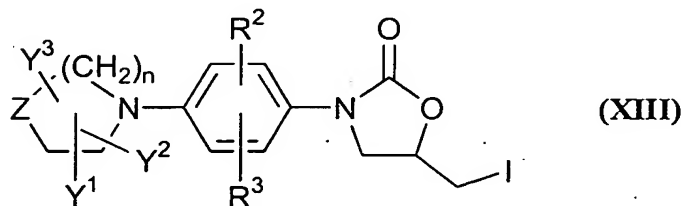
where Bn represents benzyl and all other symbols are as defined earlier with a compound of formula (XI)



where L is a leaving group to produce a compound of formula (XII) where all symbols are as defined earlier

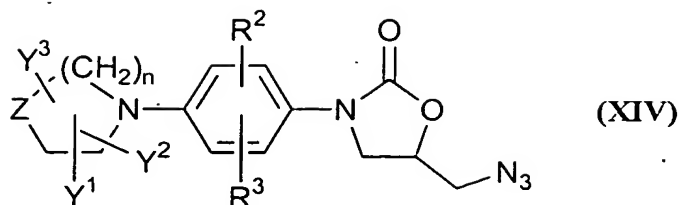


- (ii) converting the compound of formula (XII) defined above to a compound of formula (XIII)



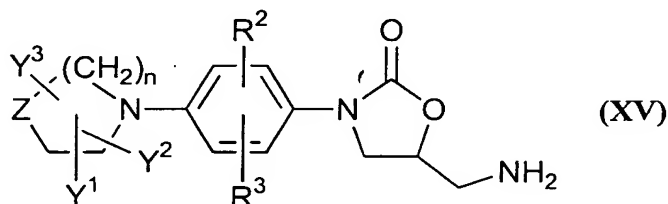
where all symbols are as defined earlier,

- (iii) converting the compound of formula (XIII) defined above to a compound of formula (XIV)



where all symbols are as defined earlier, by reacting with organic or inorganic azide

(iv) reducing the compound of formula (XIV) to a compound of formula (XV)



where all symbols are as defined earlier, which represents compound of formula (I)

where R^4 represents hydrogen atom and

(v) if desired, converting the compound of formula (XV) to a compound of formula (I) where R^4 represents acyl or thioacyl group.

The reaction of a compound of formula (III) with a compound of formula (XI) may be carried out in the presence of base such as NaH, KH, K_2CO_3 , Na_2CO_3 , potassium iodide or a phase transfer catalyst such as tetrabutylammonium halide and the like. The reaction may be carried out in the presence of a suitable solvent such as chloroform, THF, DMF, DMSO and the like or mixtures thereof. The reaction may be carried out at a temperature in the range of 30-120 °C, preferably at 60 °C. The reaction time may range from 2 to 20 h, preferably from 4 to 6 h.

The conversion of a compound of formula (XII) to a compound of formula (XIII) defined above may be carried in the presence of a base such as I_2 , KI, or NaI. The reaction may be carried out in the presence of solvents such as $CHCl_3$, CH_2Cl_2 , THF, DMF, DMSO and the like or mixtures thereof. The reaction temperature may be in the range of 0 °C to 100 °C, preferably at a temperature of 60 °C. The reaction time may range from 2 to 24 hours, preferably from 2 to 12 hours.

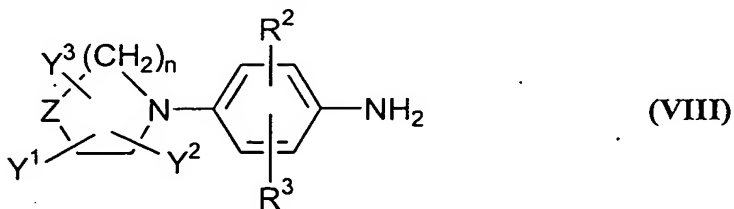
The conversion of a compound of formula (XIII) to a compound of formula (XIV) may be carried out in the presence of more than one equivalent of alkali metal azide such as LiN_3 , NaN_3 or trialkyl silylazide. The reaction may be carried out in the presence of solvent such as THF, acetone, DMF, DMSO and the like or mixtures thereof. The reaction may be carried out in inert atmosphere, which may be maintained using N_2 , Ar, He and the like. The reaction may be carried out at a temperature in the range of ambient temperature to reflux temperature of the solvent, preferably at a temperature in the range of 50°C to 80°C . The reaction time may range from 0.5 h to 18 h, preferably 1 h to 4 h.

The reduction of a compound of formula (XIV) to a compound of formula (XV) may be carried out in the presence of gaseous hydrogen and a catalyst such as Pd/C, Rh/C, Pt/C, and the like. Mixtures of catalysts may be used. The reaction may also be conducted in the presence of solvents such as dioxane, acetic acid, ethyl acetate, alcohol such as methanol, ethanol or isopropanol and the like. A pressure between atmospheric pressure and 60 psi may be employed. The catalyst may be preferably 5 - 10 % Pd/C and the amount of catalyst used may range from 5 - 50 % w/w. The reaction may also be carried out by employing metal solvent reduction such as magnesium in alcohol or sodium amalgam in alcohol, preferably methanol.

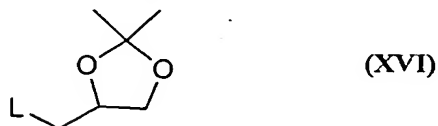
The conversion of a compound of formula (XV) defined above to a compound of formula (I) defined above may be carried out using appropriate acyl halides, thioacylhalides, anhydrides, thio acylhalides or thioanhydrides in the presence of a base.

In yet another embodiment of the present invention, there is provided a process for the preparation of compound of formula (I) defined above, which comprises :

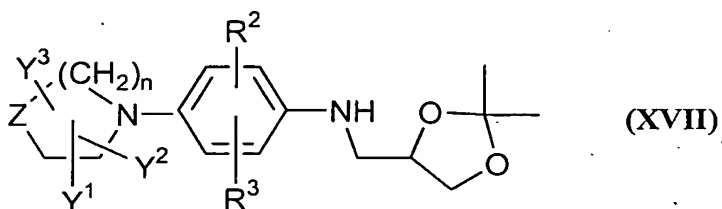
- (i) reacting a compound of formula (VIII)



where all the symbols are as defined above with a compound of formula (XVI)

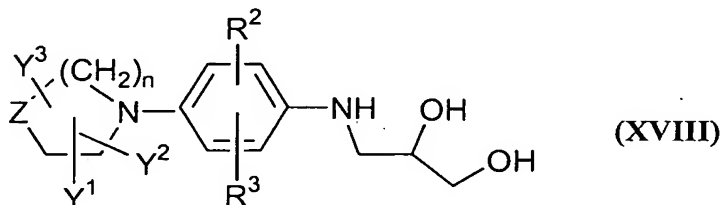


where L is a leaving group to produce a compound of formula (XVII)



where all symbols are as defined earlier,

(ii) hydrolysing the acetonide moiety in the compound of formula (XVII) using conventional methods to produce a compound of formula (XVIII)



where all symbols are as defined above,

(iii) carbonylating the compound of formula (XVIII) defined above with a suitable carbonylating agent to produce the compound of formula (I) where R^1 represents hydroxy group and all other symbols are as defined above and

(iv) if, desired, converting the compound of formula (I) where R^1 represents hydroxy group to a compound of formula (I) where R^1 represents NHR^4 or $N(R^4)_2$, by conventional methods.

The reaction of a compound of formula (VIII) with a compound of formula (XVI) to produce a compound of formula (XVII) may be carried out in the presence of phase transfer catalyst such as tetrabutylammonium halide in the presence or absence of a base. The base employed may be selected from K_2CO_3 , NaH, t-BuOK and the like or mixtures thereof. The reaction may be carried out in the presence of solvents such as DMF, THF, DMSO, EtOH and the like or mixtures thereof. The reaction may be carried

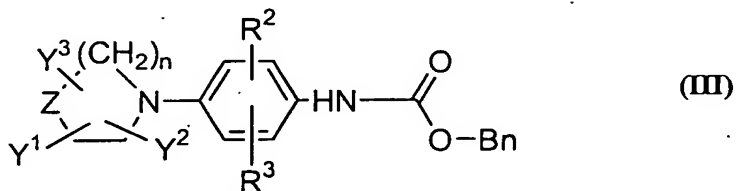
at a temperature in the range of 0 °C to 120 °C, preferably at a temperature in the range of 0 °C to 100 °C. The reaction time may range from 2 to 24 h, preferably from 2 to 20 h.

The hydrolysis of a compound of formula (XVII) to produce a compound of formula (XVIII) may be carried out using dilute mineral acid such as HCl, H₂SO₄ and the like, organic acids such as aqueous acetic acid, p-toluene sulfonic acid, trifluoroacetic acid and the like. The reaction may be carried out in the presence of suitable solvent such as water, methanol, THF, dioxane and the like or mixtures thereof. The reaction may be carried at a temperature in the range of 30 °C to 100 °C, preferably at a temperature in the range of 30 °C to 60 °C. The reaction time may range from 10 min to 5 h, preferably from 30 min to 2.5 h.

The conversion of a compound of formula (XVIII) to a compound of formula (I) where R¹ represents hydroxy group may be carried out using a carbonylating agent such as dialkyl carbonate, dihalo carbonate, 1,1'-carbonyldiimidazole and the like in the presence of a base. The base may be selected from triethylamine, tributylamine, diisopropylethylamine, DABCO, DBU, DBN or the inorganic bases such as NaOH, KOH, NaOEt, NaOMe and the like. The reaction may be carried out in the presence of solvents such as dichloromethane, THF, DMF, ethyl acetate, isopropanol and the like or mixtures thereof. The reaction temperature may be in the range of -20 °C to 50 °C, preferably at a temperature in the range of 15 °C to 30 °C. The reaction time may range from 2 to 72 hours, preferably from 2 to 50 hours.

In still another embodiment of the present invention there is provided a process for the preparation of compounds of formula (I) as defined above, which comprises:

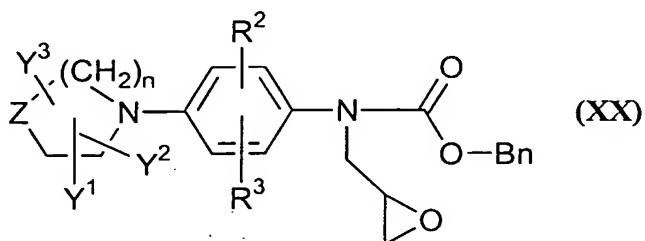
- (i) reacting a compound of formula (III)



where Bn represents benzyl and all other symbols are as defined earlier with a compound of formula (XIX)

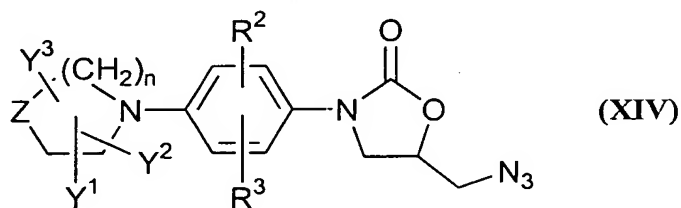


where L is a leaving group to produce a compound of formula (XX)



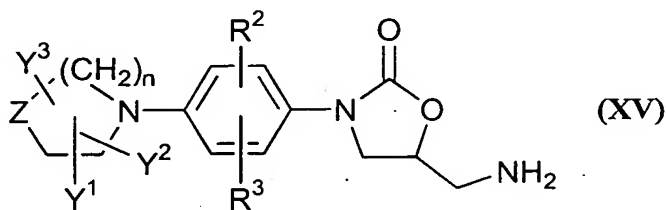
where Bn represents benzyl and all other symbols are as defined earlier,

(ii) converting the compound of formula (XX) defined above to a compound of formula (XIV)



where all symbols are as defined above, by reacting with an organic or an inorganic azide,

(iii) reducing the compound of formula (XIV) to a compound of formula of (XV)



where all symbols are as defined earlier, and

(iv) if desired, converting the compound of formula (XV) to a compound of formula (III) where R⁴ represents acyl or thioacyl group.

The reaction of a compound of formula (III) defined above with a compound of formula (XIX) defined above may be carried out in the presence of a base such as NaH, Na₂CO₃, K₂CO₃, n-BuLi and the like or mixtures thereof. The reaction may be carried out in the presence of solvents such as DMF, THF, DMSO and the like or mixtures thereof. The reaction may be carried out at a temperature in the range of 0 °C to 70 °C preferably at a temperature in the range of 0 °C to 50 °C. The reaction time may range from 1 h to 15 h preferably 1 h to 10 h.

The conversion of a compound of formula (XX) to a compound of formula (XIV) may be carried out in the presence of more than one equivalent of alkali metal azide such as LiN₃, NaN₃ or trialkyl silylazide. The reaction may be carried out in the presence of solvent such as THF, acetone, DMF, DMSO and the like or mixtures thereof. The reaction may be carried out in inert atmosphere, which may be maintained using N₂, Ar, He and the like. The reaction may be carried out at a temperature in the range of ambient temperature to reflux temperature of the solvent, preferably at a temperature in the range of 50 °C to 80 °C. The reaction time may range from 0.5 h to 18 h, preferably 1 h to 4 h.

The reduction of a compound of formula (XIV) to a compound of formula (XV) may be carried out in the presence of gaseous hydrogen and a catalyst such as Pd/C, Rh/C, Pt/C, and the like. Mixtures of catalysts may be used. The reaction may also be conducted in the presence of solvents such as dioxane, acetic acid, ethyl acetate, alcohol such as methanol, ethanol or isopropanol and the like. A pressure between atmospheric pressure and 60 psi may be employed. The catalyst may be preferably 5 - 10 % Pd/C and the amount of catalyst used may range from 5 - 50 % w/w. The reaction may also be carried out by employing metal solvent reduction such as magnesium in alcohol or sodium amalgam in alcohol, preferably methanol.

The conversion of a compound of formula (XV) defined above to a compound of formula (I) defined above may be carried out using appropriate acyl halides, thioacylhalides, anhydrides, thio acylhalides or thioanhydrides in the presence of a base.

Alternatively, the compound of formula (I) where R^4 represents acyl or thioacyl group may be prepared by reacting a compound of formula (XIV) with suitable reducing and acetylating agents.

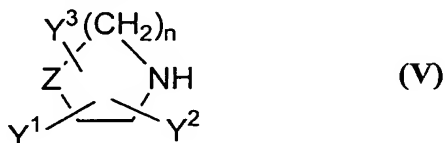
The compound of formula (XIV) defined above may be converted to a compound of formula (I) defined above in the presence of trivalent phosphorous compound such as triphenyl phosphine and acylating agent such as acid chloride like CH_3COCl , CH_3CH_2COCl , CH_3CSCl , CH_3CH_2CSCl and the like, or anhydrides such as acetic anhydride and the like in the presence of water in a suitable solvent such as THF, DMF and the like or mixtures thereof. The reaction may be carried out at a temperature in the range of $-10\text{ }^{\circ}C$ to $125\text{ }^{\circ}C$, preferably in the range of $0\text{ }^{\circ}C$ to $25\text{ }^{\circ}C$. The reaction time may range from 1 h to 24 h, preferably from 2 h to 6 h.

Alternatively, the compound of formula (XIV) may be converted to compound of formula (I) directly using thioacetic acid.

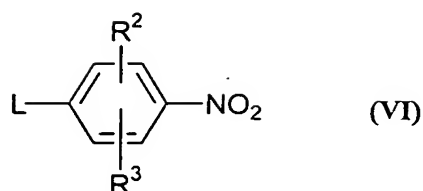
The compound of formula (XIV) defined above may be converted to a compound of formula (I) defined above using thioacetic acid without using any solvent. The reaction may be carried out at a temperature in the range of $25\text{ }^{\circ}C$ to $40\text{ }^{\circ}C$, preferably at room temperature. The reaction may range from 3 h to 12 h, preferably from 4 h to 6 h.

In still another embodiment of the present invention there is provided a process for the preparation of compounds of formula (VIII), which comprises :

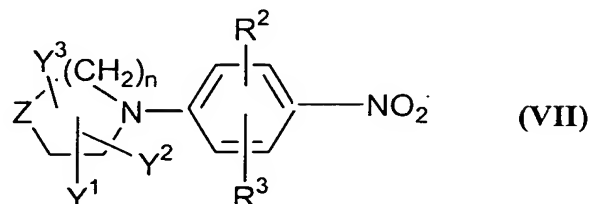
- (i) reacting a compound of formula (V)



where all symbols are as defined above with a compound of formula (VI)

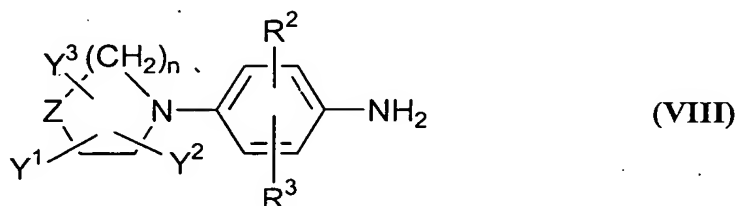


where L represents halogen atom and all other symbols are as defined above to produce a compound of formula (VII)



where all symbols are as defined above and

(ii) reducing the compound of formula (VII) to produce a compound of formula (VIII)



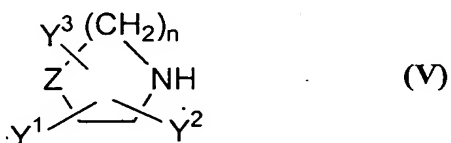
The reaction of a compound of formula (V) with a compound of formula (VI) to produce a compound of formula (VII) may be carried out using a base such as KOH, NaOH, K₂CO₃, Na₂CO₃, triethylamine, diisopropylethyl amine and the like. The reaction may be carried out using a solvent such as DMSO, DMF, acetonitrile, chloroform and the like or mixtures thereof. The reaction may be carried out in inert atmosphere, which may be maintained using inert gases such as N₂, Ar or He. The reaction may be carried out at a temperature in the range of 40 °C - 100 °C, preferably at a temperature in the range of 40 °C - 80 °C. The reaction time may range from 4 to 15 h, preferably from 6 to 12 h.

The reduction of a compound of formula (VII) to produce a compound of formula (VIII) may be carried out in the presence of gaseous hydrogen and a catalyst

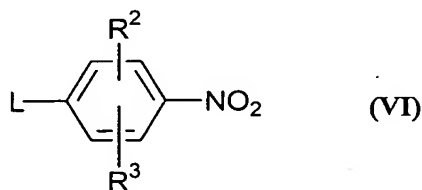
such as Pd/C, Rh/C, Pt/C and the like. Mixtures of catalyst may be used. The reduction may be conducted in the presence of solvents such as dioxane, acetic acid, ethyl acetate, alcohol such as methanol, ethanol and the like. A pressure between atmospheric pressure to 60 psi may be used. The reaction may be carried out at a temperature from 25 °C to 60 °C, preferably at room temperature. The reaction time ranges from 6 to 12 h. The reduction may also be carried out employing metal in mineral acids such as tin in HCl, iron in HCl, Zn/HCl, Zn/CH₃CO₂H and the like.

In still another embodiment of the present invention the compound of formula (X) may be prepared by a process, which comprises :

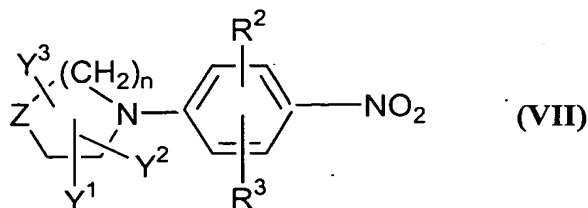
- (i) reacting a compound of formula (V)



where all symbols are as defined above with a compound of formula (VI)

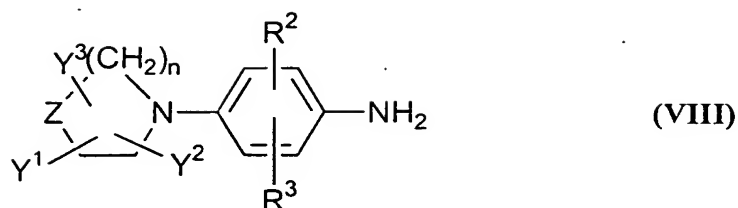


where L represents halogen atom and all other symbols are as defined above to produce a compound of formula (VII)



where all symbols are as defined above,

- (ii) reducing the compound of formula (VII) to produce a compound of formula (VIII)

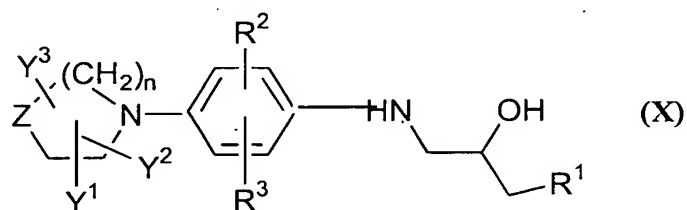


where all symbols are as defined above and

(iii) reacting the compound of formula (VIII) with a compound of formula (IX)



where R¹ is as defined earlier to produce a compound of formula (X)



where all symbols are as defined above.

The reaction of a compound of formula (V) with a compound of formula (VI) to produce a compound of formula (VII) may be carried out using a base such as KOH, NaOH, K₂CO₃, Na₂CO₃, triethylamine, diisopropylethyl amine and the like. The reaction may be carried out using a solvent such as DMSO, DMF, acetonitrile, chloroform and the like or mixtures thereof. The reaction may be carried out in inert atmosphere, which may be maintained using inert gases such as N₂, Ar or He. The reaction may be carried out at a temperature in the range of 40 °C - 100 °C, preferably at a temperature in the range of 40 °C - 80 °C. The reaction time may range from 4 to 15 h, preferably from 6 to 12 h.

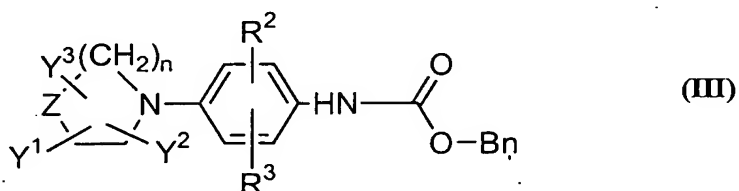
The reduction of a compound of formula (VII) to produce a compound of formula (VIII) may be carried out in the presence of gaseous hydrogen and a catalyst such as Pd/C, Rh/C, Pt/C and the like. Mixtures of catalyst may be used. The reduction may be conducted in the presence of solvents such as dioxane, acetic acid, ethyl acetate, alcohol such as methanol, ethanol and the like. A pressure between atmospheric pressure

to 60 psi may be used. The reaction may be carried out at a temperature from 25 °C to 60 °C, preferably at room temperature. The reaction time ranges from 6 to 12 h. The reduction may also be carried out employing metal in mineral acids such tin in HCl, iron in HCl, Zn/HCl, Zn/CH₃CO₂H and the like.

The reaction of a compound of formula (VIII) defined above with a compound of formula (IX) defined above to produce a compound of formula (X) may be carried out in the presence or absence of a base such as K₂CO₃, NaH, t-BuOK and the like or mixtures thereof. The reaction may be carried out in the presence of solvents such as DMF, THF, CH₃CN, alcohol like methanol, ethanol or isopropanol and the like or mixtures thereof. The reaction may also be carried out in the presence of Lewis acids such as BF₃.OEt₂, ZnCl₂, Ti(OiPr)₄, lanthanide metal complexes and the like in the presence of DCE, DMF, THF and the like or mixtures thereof. The reaction temperature may be in the range of 30 °C to 120 °C, preferably at a temperature in the range of 30 °C to 100 °C. The reaction time may range from 3 to 24 h, preferably from 4 to 12 h.

In still another embodiment of the present invention the compound of formula (XIV) may be prepared by a process, which comprises

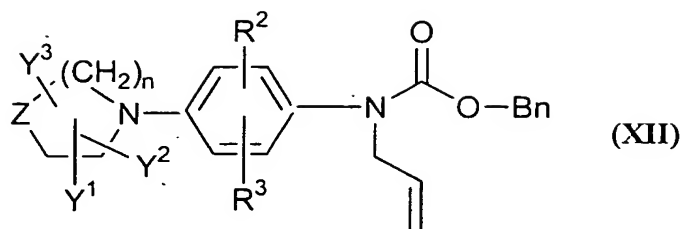
- (i) reacting a compound of formula (III)



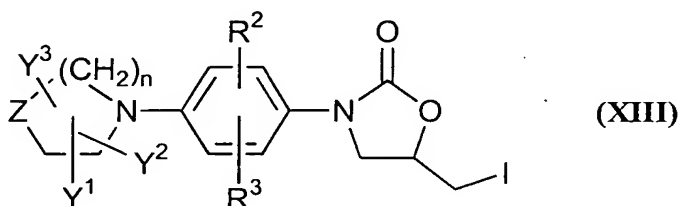
where Bn represents benzyl and all other symbols are as defined earlier with a compound of formula (XI)



where L is a leaving group to produce a compound of formula (XII) where all symbols are as defined above,

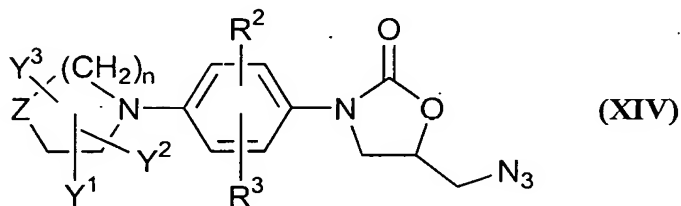


(ii) converting the compound of formula (XII) defined above to a compound of formula (XIII)



where all symbols are as defined above and

(iii) converting the compound of formula (XIII) defined above to a compound of formula (XIV)



by reacting with organic or inorganic azide.

The reaction of a compound of formula (III) with a compound of formula (XI) may be carried out in the presence of base such as NaH, KH, K₂CO₃, Na₂CO₃, potassium iodide or a phase transfer catalyst such as tetrabutylammonium halide and the like. The reaction may be carried out in the presence of a suitable solvent such as chloroform, THF, DMF, DMSO and the like or mixtures thereof. The reaction may be carried out at a temperature in the range of 30-120 °C, preferably at 60 °C. The reaction time may range from 2 to 20 h, preferably from 4 to 6 h.

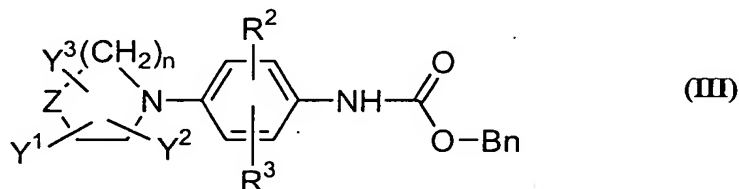
The conversion of a compound of formula (XII) to a compound of formula (XIII) defined above may be carried in the presence of a base such as I₂, KI, or NaI. The reaction may be carried out in the presence of solvents such as CHCl₃, CH₂Cl₂, THF,

DMF, DMSO and the like or mixtures thereof. The reaction temperature may be in the range of 0 °C to 100 °C, preferably at a temperature of 60 °C. The reaction time may range from 2 to 24 hours, preferably from 2 to 12 hours.

The conversion of a compound of formula (XIII) to a compound of formula (XIV) may be carried out in the presence of more than one equivalent of alkali metal azide such as LiN_3 , NaN_3 or trialkyl silylazide. The reaction may be carried out in the presence of solvent such as THF, acetone, DMF, DMSO and the like or mixtures thereof. The reaction may be carried out in inert atmosphere, which may be maintained using N_2 , Ar, He and the like. The reaction may be carried out at a temperature in the range of ambient temperature to reflux temperature of the solvent, preferably at a temperature in the range of 50 °C to 80 °C. The reaction time may range from 0.5 h to 18 h, preferably 1 h to 4 h.

Alternatively, the novel intermediate of formula (XIV) may be prepared by a process, which comprises :

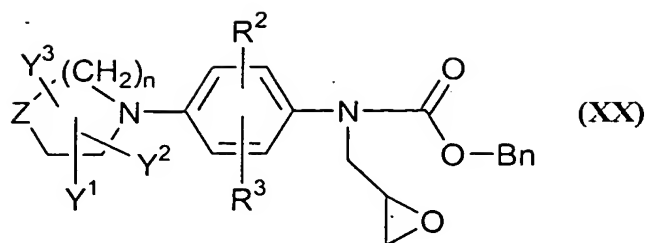
- (i) reacting a compound of formula (III)



where Bn represents benzyl and all other symbols are as defined earlier with a compound of formula (XIX)

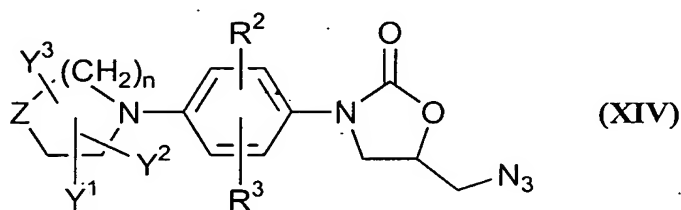


where L is a leaving group to produce a compound of formula (XX)



where Bn represents benzyl and all other symbols are as defined above and

(ii) converting the compound of formula (XX) defined above to a compound of formula (XIV)

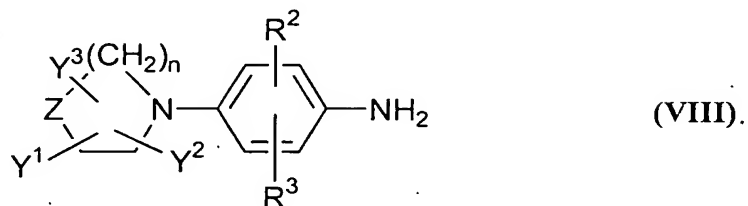


where all symbols are as defined above, by reacting with organic or inorganic azide.

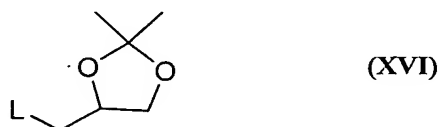
The reaction of a compound of formula (III) defined above with a compound of formula (XIX) defined above may be carried out in the presence of a base such as NaH, Na₂CO₃, K₂CO₃, n-BuLi and the like or mixtures thereof. The reaction may be carried out in the presence of solvents such as DMF, THF, DMSO and the like or mixtures thereof. The reaction may be carried out at a temperature in the range of 0 °C to 70 °C preferably at a temperature in the range of 0 °C to 50 °C. The reaction time may range from 1 h to 15 h preferably 1 h to 10 h.

The conversion of a compound of formula (XX) to a compound of formula (XIV) may be carried out in the presence of more than one equivalent of alkali metal azide such as LiN₃, NaN₃ or trialkyl silylazide. The reaction may be carried out in the presence of solvent such as THF, acetone, DMF, DMSO and the like or mixtures thereof. The reaction may be carried out in inert atmosphere, which may be maintained using N₂, Ar, He and the like. The reaction may be carried out at a temperature in the range of ambient temperature to reflux temperature of the solvent, preferably at a temperature in the range of 50 °C to 80 °C. The reaction time may range from 0.5 h to 18 h, preferably 1 h to 4 h.

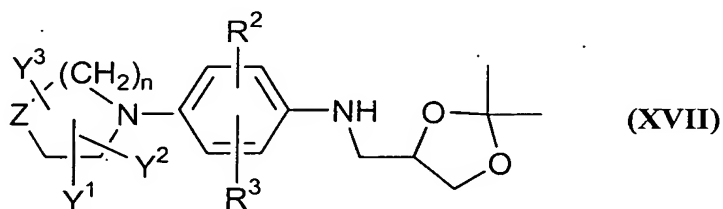
In still another embodiment of the present invention the compound of formula (XVII) may be prepared by a process, which comprises : reacting a compound of formula (VIII)



where all the symbols are as defined above with a compound of formula (XVI)



where L is a leaving group to produce a compound of formula (XVII)

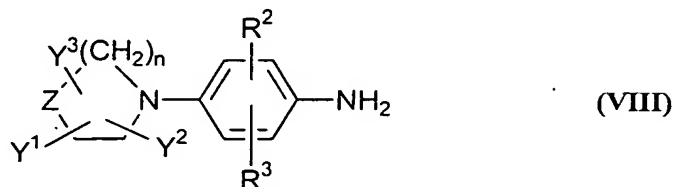


where all symbols are as defined above.

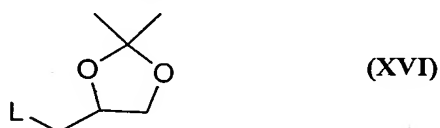
The reaction of a compound of formula (VIII) with a compound of formula (XVI) to produce a compound of formula (XVII) may be carried out in the presence of phase transfer catalyst such as tetrabutylammonium halide in the presence or absence of a base. The base employed may be selected from K_2CO_3 , NaH, t-BuOK and the like or mixtures thereof. The reaction may be carried out in the presence of solvents such as DMF, THF, DMSO, EtOH and the like or mixtures thereof. The reaction may be carried at a temperature in the range of 0 °C to 120 °C, preferably at a temperature in the range of 0 °C to 100 °C. The reaction time may range from 2 to 24 h, preferably from 2 to 20 h.

In still another embodiment of the present invention the compound of formula (XVIII) may be prepared by a process, which comprises :

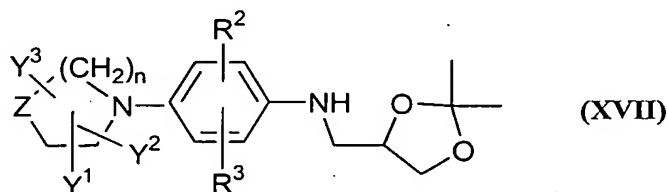
- (i) reacting a compound of formula (VIII)



where all the symbols are as defined above with a compound of formula (XVI)

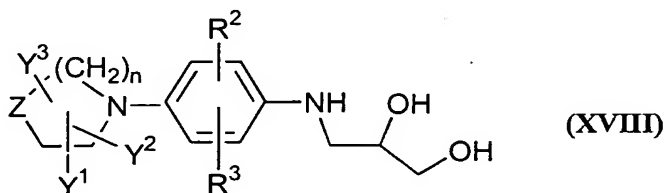


where L is a leaving group to produce a compound of formula (XVII)



where all symbols are as defined above and

- (ii) hydrolysing the acetone moiety in the compound of formula (XVII) using conventional methods to produce a compound of formula (XVIII)



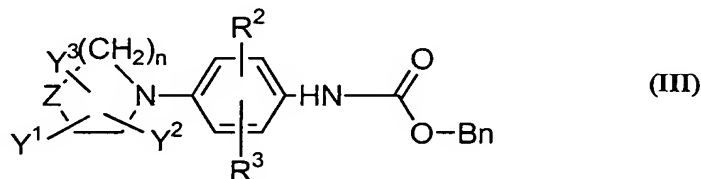
where all symbols are as defined above.

The reaction of a compound of formula (VIII) with a compound of formula (XVI) to produce a compound of formula (XVII) may be carried out in the presence of phase transfer catalyst such as tetrabutylammonium halide in the presence or absence of a base. The base employed may be selected from K_2CO_3 , NaH, t-BuOK and the like or mixtures thereof. The reaction may be carried out in the presence of solvents such as

DMF, THF, DMSO, EtOH and the like or mixtures thereof. The reaction may be carried at a temperature in the range of 0 °C to 120 °C, preferably at a temperature in the range of 0 °C to 100 °C. The reaction time may range from 2 to 24 h, preferably from 2 to 20 h.

The hydrolysis of a compound of formula (XVII) to produce a compound of formula (XVIII) may be carried out using dilute mineral acid such as HCl, H₂SO₄ and the like, organic acids such as aqueous acetic acid, p-toluene sulfonic acid, trifluoroacetic acid and the like. The reaction may be carried out in the presence of suitable solvent such as water, methanol, THF, dioxane and the like or mixtures thereof. The reaction may be carried at a temperature in the range of 30 °C to 100 °C, preferably at a temperature in the range of 30 °C to 60 °C. The reaction time may range from 10 min to 5 h, preferably from 30 min to 2.5 h.

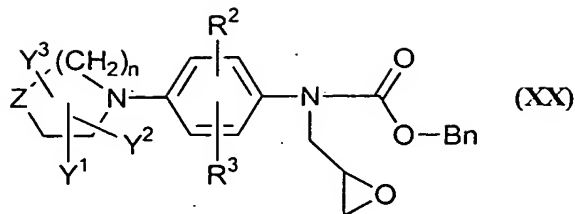
In still another embodiment of the present invention the compound of formula (XX) may be prepared by a process, which comprises : reacting a compound of formula (III)



where Bn represents benzyl and all other symbols are as defined earlier with a compound of formula (XIX)



where L is a leaving group to produce a compound of formula (XX)



where Bn represents benzyl and all other symbols are as defined above.

The reaction of a compound of formula (III) defined above with a compound of formula (XIX) defined above may be carried out in the presence of a base such as NaH, Na₂CO₃, K₂CO₃, n-BuLi and the like or mixtures thereof. The reaction may be carried out in the presence of solvents such as DMF, THF, DMSO and the like or mixtures thereof. The reaction may be carried out at a temperature in the range of 0 °C to 70 °C preferably at a temperature in the range of 0 °C to 50 °C. The reaction time may range from 1 h to 15 h preferably 1 h to 10 h.

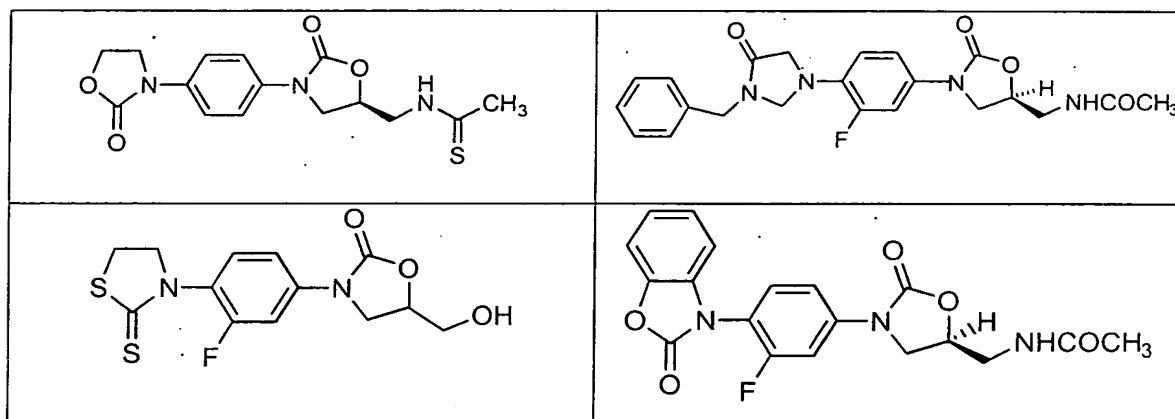
The leaving group represented by L in any of the formulae above may be a halogen atom like chlorine, bromine or iodine or other leaving groups such as mesylate, tosylate, triflate and the like.

The enantiomer which is pharmacologically active is the enantiomer with the "S" configuration. The racemic mixture and the "R" enantiomer are also useful in the same way and for the same purpose as the "S" enantiomer. However, the activity of the racemic mixture and the "R" enantiomer would differ from the "S" enantiomer. The enantiomers may be prepared by using reactants in their single enantiomeric form in the process wherever applicable or by conducting the reaction in the presence of reagents or catalysts in their single enantiomeric form. The single enantiomers may also be prepared by resolving the racemic mixture by conventional methods.

Various polymorphs of a compound of general formula (I) forming part of this invention may be prepared by crystallization of compound of formula (I) under different conditions. For example, using different solvents commonly used or their mixtures for recrystallization; crystallizations at different temperatures; various modes of cooling, ranging from very fast to very slow cooling during crystallizations. Polymorphs may also be obtained by heating or melting the compound followed by gradual or fast

cooling. The presence of polymorphs may be determined by solid probe nmr spectroscopy, IR spectroscopy, differential scanning calorimetry, powder X-ray diffraction or such other techniques.

Representative compounds of the general formula (I) prepared according to the process of the present invention are listed below :



Dated this

day of

2001

Dr. S. Padmaja
Sr. Manager - IPM
Dr. Reddy's Research Foundation